

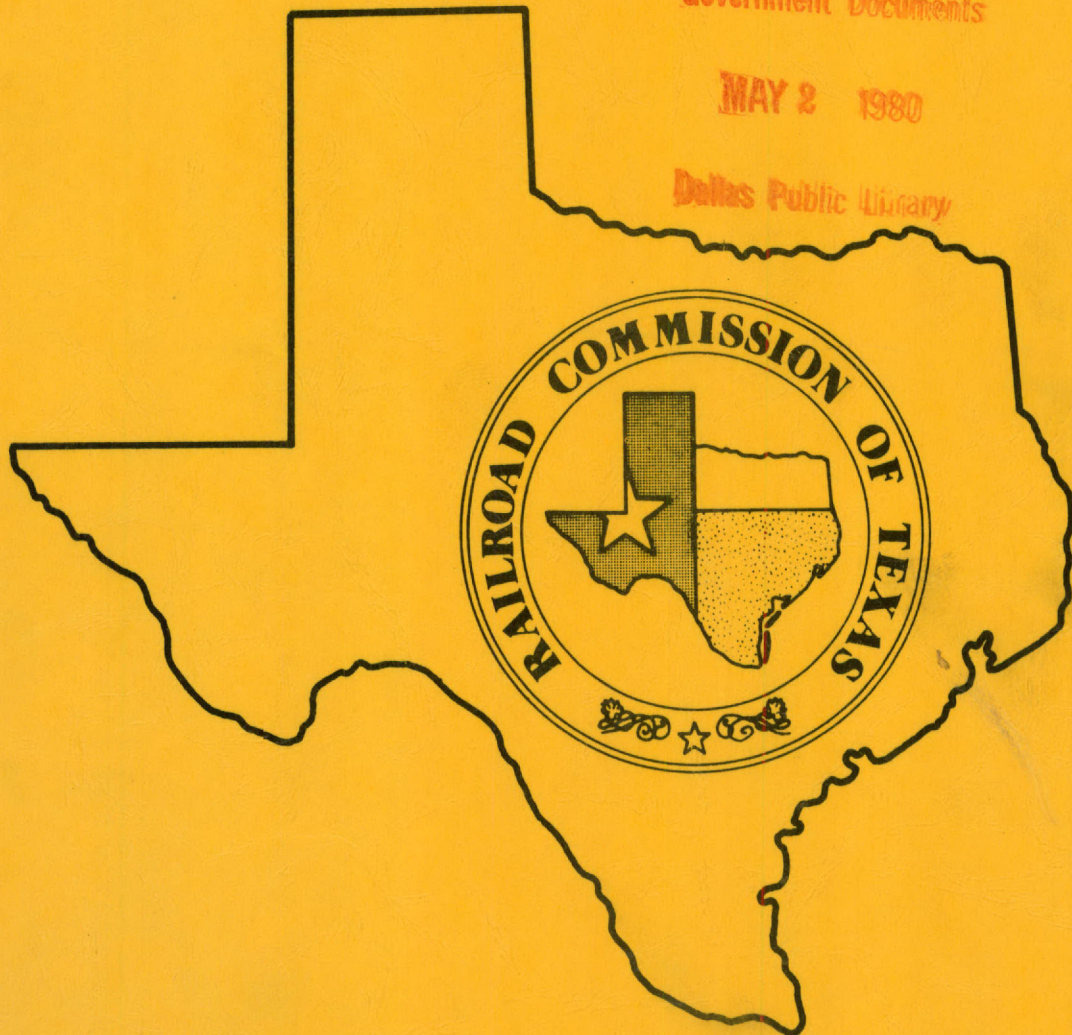
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RULES AND REGULATIONS FOR THE TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE

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INTRODUCTION

This publication is a compilation of the gas pipeline safety rules and regulations which have been adopted and promulgated by the Commission. The inclusion of 49 CFR 191 is done for continuity even though it has not been adopted. Portions of 49 CFR 191 are applicable as they describe Federal forms required by Gas Utilities Docket 446, Rule 7(2).

All regulations herein are current as of March 1, 1980. All amendments or supplements to that date are inserted. Effective dates have been published previously and apply.

The material herein reproduced was compiled from various sources and errors which may exist are not intentional.

Special Note:

Amendments developed by the Railroad Commission and promulgated on January 21, 1980 are inserted as follows:

Definitions	- Added, "Short Section of Pipe"
192.455(b)	- Supplement to First Sentence
192.457(b)(3)	- Supplement to Second Sentence
192.457(d)	- Added New
192.465(a)	- Supplement to First Sentence
192.465(e)	- Supplement to End of Second Sentence
192.465(f)	- Added New
192.475(a)	- Added New Second Paragraph
192.479(c)	- Added New

Sections 192.283, 192.285, and 192.287 become effective July 1, 1980.

INTRODUCTION

This publication is a compilation of the gas pipeline safety rules and regulations which have been adopted and promulgated by the Commission. The inclusion of 49 CFR 191 is done for consistency even though it has not been adopted. Portions of 49 CFR 191 are applicable as they describe Federal forms required by gas utilities. (See Rule 191.1)

All regulations herein are current as of March 1, 1980. All amendments or supplements to this date are inserted. Effective dates have been published previously and apply.

The material herein reproduced was compiled from various sources and errors which may exist are not intentional.

Special Note:

Amendments developed by the Railroad Commission and promulgated on January 21, 1980 are inserted as follows:

- 191.103(a) - Added new
- 191.103(b) - Added new
- 191.103(c) - Added new
- 191.103(d) - Added new
- 191.103(e) - Added new
- 191.103(f) - Added new
- 191.103(g) - Added new
- 191.103(h) - Added new
- 191.103(i) - Added new
- 191.103(j) - Added new
- 191.103(k) - Added new
- 191.103(l) - Added new
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- 191.103(u) - Added new
- 191.103(v) - Added new
- 191.103(w) - Added new
- 191.103(x) - Added new
- 191.103(y) - Added new
- 191.103(z) - Added new

Sections 191.103, 191.104, and 191.105 become effective July 1, 1980.

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PART 191--TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE: REPORTS OF LEAKS

191.1 Scope.

(a) This part prescribes requirements for the reporting of gas leaks that are not intended by the operator and that require immediate or scheduled repair and of test failures, by persons engaged in the transportation of gas. However, it does not apply to leaks and test failures that occur in the gathering of gas outside of the following areas:

(1) An area within the limits of any incorporated or unincorporated city, town, or village; or

(2) Any designated residential or commercial area such as a subdivision, business or shopping center, or community development.

(b) The reporting requirements in this part supersede any accident or leak reporting requirements that were incorporated by reference in the Interim Minimum Federal Safety Standards in Part 190 of this chapter.

191.3 Definitions.

As used in this part and in the DOT Forms referenced in this part--

"Gas" means natural gas, flammable gas, or gas which is toxic or corrosive;

"Municipality" means a city, county, or any other political subdivision of a State;

"Operator" means a person who engages in the transportation of gas;

"Person" means any individual, firm, joint venture, partnership, corporation, association, State, municipality, cooperative association, or joint stock association, and includes any trustee, receiver, assignee, or personal representative thereof;

"Pipeline facilities" includes, without limitation, new and existing pipe, right-of-way, and any equipment facility, or building used in the

transportation of gas or the treatment of gas during the course of transportation;

"Secretary" means the Secretary of Transportation or any person to whom he has delegated authority in the matter concerned;

"State" includes each of the several States, the District of Columbia, and the Commonwealth of Puerto Rico;

"System" means all pipeline facilities used by a particular operator in the transportation of gas, including but not limited to, line pipe, valves and other appurtenances connected to line pipe compressor units, fabricated assemblies associated with compressor units, metering (including customers' meters) and delivery stations, and fabricated assemblies in metering and delivery stations;

"Test failure" means a break or rupture that occurs during strength-proof testing of transmission or gathering lines that is of such magnitude as to require repair before continuation of the test;

"Transportation of gas" means the gathering, transmission, or distribution of gas by pipeline, or the storage of gas in or affecting interstate or foreign commerce.

191.5 Telephonic notice of certain leaks.

(a) At the earliest practicable moment following discovery, each operator shall give notice in accordance with paragraph (b) of this section of any leak that--

(1) Caused a death or a personal injury requiring hospitalization;

(2) Required the taking of any segment of transmission pipeline out of service;

(3) Resulted in gas igniting;

(4) Caused estimated damage to the property of the operator, or others, or both, of a total of \$5,000 or more; or

(5) In the judgment of the operator, was significant even though it did not meet the criteria of subparagraphs (1), (2), (3), or (4) of this paragraph.

An operator need not give notice of a leak that met only the criteria of

subparagraph (2) or (3) of this paragraph, if it occurred solely as a result of, or in connection with, planned or routine maintenance or construction.

(b) Each notice required by paragraph (a) of this section shall be made by telephone to Area Code (202) 426-0700 and shall include the following information.

- (1) The location of the leak.
- (2) The time of the leak.
- (3) The fatalities and personal injuries, if any.
- (4) All other significant facts that are known by the operator that are relevant to the cause of the leak or extent of the damages.

(35 F.R. 320, Jan. 8, 1970, as amended by Amdt. 191-1, 36 F.R. 7507, Apr. 2, 1971)

191.7 Addressee for written reports.

Each written report required by this part must be made to the Director, Office of Pipeline Safety, Department of Transportation, Washington, D.C. 20590. However, reports for intrastate facilities subject to the jurisdiction of a State agency pursuant to certification under section 5(a) of the Natural Gas Pipeline Safety Act, may be submitted in duplicate to the State agency if the regulations of that agency require submission of these reports and provide for further transmittal of one copy, within 10 days of receipt for leak reports and not later than February 15 for annual reports, to the Director, Office of Pipeline Safety.

191.9 Distribution system: Leak report.

(a) Each operator of a distribution system serving more than 100,000 customers shall, as soon as practicable but not more than 20 days after detection, report the following on Department of Transportation Form DOT-F-7100.1:

- (1) A leak that required notice by telephone under 191.5.
- (2) A leak that, because of its location, required immediate repair and other emergency action to protect the

public such as evacuation of a building, blocking off an area, or rerouting of traffic.

(b) Where additional related information is obtained after a report is submitted under paragraph (a) of this section, the operator shall make a supplemental report as soon as practicable with a clear reference by date and subject to the original report.

191.11 Distribution system: Annual Report.

(a) Except as provided in paragraph (b) of this section, each operator of a distribution system shall submit an annual report on Department of Transportation Form DOT F 7100.1-1. This report must be submitted not later than February 15 for the preceding calendar year.

(b) The annual report required by paragraph (a) of this section need not be submitted with respect to petroleum gas systems which serve less than 100 customers from a single source. (Amdt. 191.-2, 37 F.R. 1173, Jan. 26, 1972)

191.13 Distribution system: Certain facilities reported as a transmission system.

Each operator of a distribution system shall, for pipeline facilities that operate at 20 percent or more of specified minimum yield strength, or that are used to convey gas into or out of storage, submit reports for those facilities under 191.15 and 191.17:

191.15 Transmission and gathering systems: Leak report.

(a) Each operator of a transmission system or a gathering system shall, as soon as practicable but not more than 20 days after detection, report the following on Department of Transportation Form DOT-F-7100.2:

- (1) A leak that required notice by telephone under 191.5.

(2) A leak in a transmission line that required immediate repair.

(3) A test failure that occurred while testing either with gas or another test medium.

(b) Where additional related information is obtained after a report is submitted under paragraph (a) of this section, the operator shall make a supplemental report as soon as practicable with a clear reference by date and subject to the original report.

191.17 Transmission and gathering systems: Annual report.

Each operator of a transmission system or a gathering system shall submit an annual report on Department of Transportation Form DOT-F-7100.2-1. This report must be submitted for the preceding calendar year not later than February 15, 1971, and not later than February 15 of each year thereafter.

191.19 Report forms.

Copies of the prescribed report forms are available without charge upon request from the Office of Pipeline Safety. Additional copies in this prescribed format may be reproduced and used if in the same size and kind of paper. In addition, the information required by these forms may be submitted by any other means that is acceptable to the Secretary.

Note: The recordkeeping and reporting requirements of this regulation have been approved by the Bureau of the Budget in accordance with the Federal Reports Act of 1942.

(1) The purpose of this report is to provide a summary of the work done during the period from 1944 to 1945. The work was done in the Department of Physics, University of California, Berkeley, California.

(2) The work was done under the direction of Professor J. R. Oppenheimer, who was the head of the Department of Physics at that time. The work was done in the laboratory of Professor Oppenheimer, which was then known as the Radiation Laboratory.

(3) The work was done in the Department of Physics, University of California, Berkeley, California, during the period from 1944 to 1945. The work was done in the laboratory of Professor Oppenheimer, which was then known as the Radiation Laboratory.

1945 Report

The purpose of this report is to provide a summary of the work done during the period from 1944 to 1945. The work was done in the Department of Physics, University of California, Berkeley, California.

The work was done under the direction of Professor J. R. Oppenheimer, who was the head of the Department of Physics at that time. The work was done in the laboratory of Professor Oppenheimer, which was then known as the Radiation Laboratory.

1944 Report

Copies of the report are available in the Department of Physics, University of California, Berkeley, California. The report is available in the Department of Physics, University of California, Berkeley, California.

The work was done in the Department of Physics, University of California, Berkeley, California, during the period from 1944 to 1945. The work was done in the laboratory of Professor Oppenheimer, which was then known as the Radiation Laboratory.

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**PART 192—TRANSPORTATION OF NATURAL
AND OTHER GAS BY PIPELINE: MINIMUM
SAFETY STANDARDS**

Subpart A—General

192.1 Scope

(a) This part prescribes minimum safety requirements for pipeline facilities and the transportation of gas, including pipeline facilities and the transportation of gas within the limits of the outer continental shelf as that term is defined in the Outer Continental Shelf Lands Act.

(b) This part does not apply to--

(1) Offshore gathering of gas upstream from the outlet flange of each facility on the outer continental shelf where hydrocarbons are produced or where produced hydrocarbons are first separated, dehydrated, or otherwise processed, whichever facility is farther downstream; and

(2) Onshore gathering of gas outside of the following areas:

(i) An area within the limits of any incorporated or unincorporated city, town, or village.

(ii) Any designated residential or commercial area such as a subdivision, business or shopping center, or community development.

192.3 Definitions.

As used in this part--

"Distribution Line" means a pipeline other than a gathering or transmission line.

"Gas" means natural gas, flammable gas, or gas which is toxic or corrosive.

"Gathering Line" means a pipeline that transports gas from a current production facility to a transmission line or main.

"High pressure distribution system" means a distribution system in which the gas pressure in the main is higher than the pressure provided to the customer.

"Listed specification" means a specification listed in section I of Appendix B of this part.

"Low-pressure distribution system" means a distribution system in which the gas pressure in the main is substantially the same as the pressure provided to the customer.

"Main" means a distribution line that serves as a common source of supply for more than one service line.

"Maximum actual operating pressure" means the maximum pressure that occurs during normal operations over a period of 1 year.

"Maximum allowable operating pressure" means the maximum pressure at which a pipeline or segment of a pipeline may be operated under this part.

"Municipality" means a city, county, or any other political subdivision of a State.

"Offshore" means beyond the line of ordinary low water along that portion of the coast of the United States that is in direct contact with the open seas and beyond the line marking the seaward limit of inland waters.

"Operator" means a person who engages in the transportation of gas.

"Person" means any individual, firm, joint venture, partnership, corporation, association, State, municipality, cooperative association, or joint stock association, and including any trustee, receiver, assignee, or personal representative thereof.

"Pipe" means any pipe or tubing used in the transportation of gas, including pipe-type holders.

"Pipeline" means all parts of those physical facilities through which gas moves in transportation, including pipe, valves, and other appurtenance attached to pipe, compressor units, metering stations, regulator stations, delivery stations, holders, and fabricated assemblies.

"Pipeline facility" means new and existing pipelines, rights-of-way, and any equipment, facility, or building used in the transportation of gas or in the treatment of gas during the course of transportation.

"Secretary" means the Secretary of Transportation or any person to whom he has delegated authority in the matter concerned.

"Service line" means a distribution line that transports gas from a common source of supply to (1) a customer meter or the connection to a customer's piping, whichever is farther downstream, or (2) the connection to a customer's piping if

there is no customer meter. A customer meter is the meter that measures the transfer of gas from an operator to a consumer.

"Short section of pipeline" means a segment of a pipeline 100 feet or less in length.

"SMYS" means specified minimum yield strength is--

(a) For steel pipe manufactured in accordance with a listed specification, the yield strength specified as a minimum in that specification; or

(b) For steel pipe manufactured in accordance with an unknown or unlisted specification, the yield strength determined in accordance with 192.107(b).

"State" means each of the several States, the District of Columbia, and the Commonwealth of Puerto Rico.

"Transmission line" means a pipeline, other than a gathering line, that--

(a) Transports gas from a gathering line or storage facility to a distribution center or storage facility;

(b) Operates at a hoop stress of 20 percent or more of SMYS; or

(c) Transports gas within a storage field.

"Transportation of gas" means the gathering, transmission, or distribution of gas by pipeline or the storage of gas, in or affecting interstate or foreign commerce.

192.5 Class Locations.

(a) Offshore is Class 1 location. The Class location onshore is determined by applying the criteria set forth in this section: The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. Except as provided in paragraphs (d)(2) and (f) of this section, the class location is determined by the buildings in the class location unit. For the purposes of this section, each separate dwelling unit in a multiple dwelling unit building is counted as a separate building intended for human occupancy.

(b) A Class 1 location is any class location unit that has 10 or less buildings intended for human occupancy.

(c) A Class 2 location is any class location unit that has more than 10 but less than 46 buildings intended for human occupancy.

(d) A Class 3 location is:

(1) Any class location unit that has 46 or more buildings intended for human occupancy; or
(2) An area where the pipeline lies within 100 yards of any of the following:

(i) A building that is occupied by 20 or more persons during normal use.

(ii) A small, well-defined outside area that is occupied by 20 or more persons during normal use, such as a playground, recreation area, outdoor theater, or other place of public assembly.

(e) A Class 4 location is any class location unit where buildings with four or more stories above ground are prevalent.

(f) The boundaries of the class locations determined in accordance with paragraphs (a) through (e) of this section may be adjusted as follows:

(1) A Class 4 location ends 220 yards from the nearest building with four or more stories above ground.

(2) When a cluster of buildings intended for human occupancy requires a Class 3 location, the Class 3 location ends 220 yards from the nearest building in the cluster.

(3) When a cluster of buildings intended for human occupancy requires a Class 2 location, the Class 2 location ends 220 yards from the nearest building in the cluster.

192.7 Incorporation by reference.

(a) Any documents or parts thereof incorporated by reference in this part are a part of this regulation as though set out in full.

(b) All incorporated documents are available for inspection in the Office of Pipeline Safety, Room 107, 400 Sixth Street SW., Washington, D.C. In addition, the documents are available at the addresses provided in Appendix A to this part.

(c) The full titles for the publications incorporated by reference in this part are provided in Appendix A to this part.

192.9 Gathering lines.

Each gathering line must comply with the requirements of this part applicable to transmission lines.

192.11 Petroleum gas systems.

(a) No operator may transport petroleum gas in a system that serves 10 or more customers, or in a system, any portion of which is located in a public place (such as a highway), unless that system meets the requirements of this part and of NFPA Standards No. 58 and No. 59. In the event of a conflict, the requirements of this part prevail.

(b) Each petroleum gas system covered by paragraph (a) of this section must comply with the following:

- (1) Above-ground structures must have open vents near the floor level.
- (2) Below-ground structures must have forced ventilation that will prevent any accumulation of gas.
- (3) Relief valve discharge vents must be located so as to prevent any accumulation of gas at or below ground level.
- (4) Special precautions must be taken to provide adequate ventilation where excavations are made to repair an underground system.

(c) For the purpose of this section, petroleum gas means propane, butane, or mixtures of these gases, other than a gas air mixture that is used to supplement supplies in a natural gas distribution system.

192.12 Liquefied natural gas facilities.

(a) Except for a pipeline facility in operation or under construction before January 1, 1973, no operator may store, treat, or transfer liquefied natural gas in a pipeline facility unless that pipeline facility meets the applicable requirements of this part and of NFPA Standard No. 59A.

(b) No operator may store, treat, or transfer liquefied natural gas in a pipeline facility in operation or under construction before January 1, 1973, unless:

- (1) The facility is operated in accordance with the applicable operating requirements of this part and of NFPA Standard 59A; and
- (2) Each modification or repair made to the facility after December 31, 1972, conforms to the applicable requirements of this part and NFPA Standard 59A, insofar as is practicable.

192.13 General.

(a) No person may operate a segment of pipeline that is readied for service after March 12, 1971, or in the case of an offshore gathering line, after July 31, 1977, unless--

- (1) The pipeline has been designed, installed, constructed, initially inspected, and initially tested in accordance with this part; or
- (2) The pipeline qualifies for use under this part in accordance with paragraph 192.14.

(b) No person may operate a segment of pipeline that is replaced, relocated, or otherwise changed after November 12, 1970, or in the case of an offshore gathering line, after July 31, 1977, unless that replacement, relocation, or change has been made in accordance with this part.

(c) Each operator shall maintain, modify as appropriate, and follow the plans, procedures, and programs that it is required to establish under this part.

192.14 Conversion to service subject to this part.

(a) A steel pipeline previously used in service not subject to this part qualifies for use under this part if the operator prepares and follows a written procedure to carry out the following requirements:

- (1) The design, construction, operation, and maintenance history of the pipeline must be reviewed and, where sufficient historical records are not available, appropriate tests must be performed to determine if the pipeline is in a satisfactory condition for safe operation.
- (2) The pipeline right-of-way, all above-ground segments of the pipeline, and appropriately selected underground segments must be visually inspected for physical defects and operating conditions which reasonably could be expected to impair the strength or tightness of the pipeline.
- (3) All known unsafe defects and conditions must be corrected in accordance with this part.
- (4) The pipeline must be tested in accordance with Subpart J of this part to substantiate the maximum allowable operating pressure permitted by Subpart L of this part.

(b) Each operator must keep for the life of the pipeline a record of investigations, tests, repairs, replacements, and alterations made under the requirements of paragraph (a) of this section.

192.15 Rules of regulatory construction.

(a) As used in this part:

"Includes" means including but not limited to.

"May" means "is permitted to" or "is authorized to".

"May not" means "is not permitted to" or "is not authorized to".

"Shall" is used in the mandatory and imperative sense.

(b) In this part:

- (1) Words importing the singular include the plural;
- (2) Words importing the plural include the singular; and
- (3) Words importing the masculine gender include the feminine.

192.17 Filing of operation, inspection and maintenance plan.

(a) Except as provided in paragraph (b) of this section, each operator shall file with the Secretary not later than February 1, 1971, a plan for inspection and maintenance of each pipeline facility which he owns or operates. In addition, each change to an inspection and maintenance plan must be filed with the Secretary within 20 days after the change is made.

(b) The provisions of paragraph (a) of this section do not apply to pipeline facilities--

(1) That are subject to the jurisdiction of a State agency that has submitted a certification or agreement with respect to those facilities under section 5 of the Natural Gas Pipeline Safety Act (49 U.S.C. 1675); and

(2) For which an inspection and maintenance plan is required to be filed with that State agency.

(c) Plans filed with the Secretary must be sent to the office of Pipeline Safety, Department of Transportation, Washington, D.C. 20590.

Subpart B—Materials

192.51 Scope

This subpart prescribes minimum requirements for the selection and qualification of pipe and components for use in pipelines.

192.53 General

Materials for pipe and components must be:

- (a) Able to maintain the structural integrity of the pipeline under temperature and other environmental conditions that may be anticipated;
- (b) Chemically compatible with any gas that they transport and with any other material in the pipeline with which they are in contact; and
- (c) Qualified in accordance with the applicable requirements of this subpart.

192.55 Steel pipe.

(a) New steel pipe is qualified for use under this part if:

- (1) It was manufactured in accordance with a listed specification;
- (2) It meets the requirements of--
 - (i) Section II of Appendix B to this part; or
 - (ii) If it was manufactured before November 12, 1970, either section II or III of Appendix B to this part; or
- (3) It is used in accordance with paragraph (c) or (d) of this section.

(b) Used steel pipe is qualified for use under this part if:

- (1) It was manufactured in accordance with a listed specification and it meets the requirements of paragraph II-C of Appendix B to this part;
- (2) It meets the requirements of--
 - (i) Section II of Appendix B to this part; or
 - (ii) If it was manufactured before November 12, 1970, either section II or III of Appendix B to this part;
- (3) It has been used in an existing line of the same or higher pressure and meets the requirements of paragraph II-C of Appendix B to this part; or
- (4) It is used in accordance with paragraph (c) of this section.

(c) New or used steel pipe may be used at a pressure resulting in a hoop stress of less than 6,000 psi where no close coiling or close bending is to be done, if visual examination indicates that the pipe is in good condition and that it is free of split seams and other defects that would cause leakage. If it is to be welded, steel pipe that has

not been manufactured to a listed specification must also pass the weldability tests prescribed in paragraph II-B of Appendix B to this part.

(d) Steel pipe that has not been previously used may be used as replacement pipe in a segment of pipeline if it has been manufactured prior to November 12, 1970, in accordance with the same specification as the pipe used in constructing that segment of pipeline.

(e) New steel pipe that has been cold expanded must comply with the mandatory provisions of API Standards 5LX.

192.57 Cast iron or ductile iron pipe.

(a) New cast iron or new ductile iron pipe is qualified for use under this part if it has been manufactured in accordance with a listed specification.

(b) Used cast iron or used ductile iron pipe is qualified for use under this part if inspection shows that the pipe is sound and allows the makeup of tight joints and:

- (1) It has been removed from an existing pipeline that operated at the same or higher pressure; or
- (2) It was manufactured in accordance with a listed specification.

192.59 Plastic pipe.

(a) New plastic pipe is qualified for use under this part if:

- (1) When the pipe is manufactured, it is manufactured in accordance with the latest listed edition of a listed specification, except that before March 21, 1975, it may be manufactured in accordance with any listed edition of a listed specification; and
- (2) It is resistant to chemicals with which contact may be anticipated.

(b) Used plastic pipe is qualified for use under this part if:

- (1) When the pipe was manufactured, it was manufactured in accordance with the latest listed edition of a listed specification, except that pipe manufactured before March 21, 1975, need only have met the requirements of any listed edition of a listed specification;
- (2) It is resistant to chemicals with which contact may be anticipated.
- (3) It has been used only in natural gas service;
- (4) Its dimensions are still within the tolerances of the specification to which it was manufactured; and
- (5) It is free of visible defects.

(c) For the purpose of paragraphs (a)(1) and (b)(1) of this section, where pipe of a diameter included in a listed specification is impractical to use, pipe of a diameter between the sizes included in a listed specification may be used if it:

- (1) Meets the strength and design criteria required of pipe included in that listed specification; and
- (2) Is manufactured from plastic compounds which meet the criteria for material required of pipe included in that listed specification.

192.61 Copper pipe.

Copper pipe is qualified for use under this part if it has been manufactured in accordance with a listed specification.

192.63 Marking of materials.

(a) Except as provided in paragraph (e) of this section, each valve, fitting, length of pipe, and other component must be marked as prescribed in:

- (1) The specification or standard to which it was manufactured; or
- (2) MSS Standard Practice, SP-25.

(b) In addition to the requirements in paragraph (a), thermoplastic pipe manufactured in accordance with the 1974a or earlier listed edition of ASTM D2513 must be marked as required by section 9.2 of ASTM D2513 (1975b edition) unless the pipe was manufactured before May 18, 1978, and is installed where operating temperatures are not above 38° C (100°F).

(c) Surfaces of pipe and components that are subject to stress from internal pressure may not be field die stamped.

(d) If any item is marked by die stamping, the die must have blunt or rounded edges that will minimize stress concentrations.

(e) Paragraph (a) of this section does not apply to items manufactured before November 12, 1970, that meet all of the following:

- (1) The item is identifiable as to type, manufacturer, and model.
- (2) Specifications or standards giving pressure, temperature, and other appropriate criteria for the use of items are readily available.

192.65 Transportation of pipe.

In a pipeline to be operated at a hoop stress of 20 percent or more of SMYS, an operator may not use pipe having an outer diameter to wall thickness ratio of 70 to 1 or more, that is transported by railroad unless--

(a) The transportation is performed in accordance with the 1972 edition of API RP5L1, except that before February 25, 1975, the transportation may be performed in accordance with the 1967 edition of API RP5L1.

(b) In the case of pipe transported before November 12, 1970 the pipe is tested in accordance with Subpart J of this part to at least 1.25 times the maximum allowable operating pressure if it is to be installed in a class 1 location and to at least 1.5 times the maximum allowable operating pressure if it is to be installed in a class 2, 3, or 4 location. Notwithstanding any shorter time period permitted under Subpart J of this part, the test pressure must be maintained for at least 8 hours.

Subpart C--Pipe Design

192.101 Scope

This subpart prescribes the minimum requirements for the design of pipe.

192.103 General

Pipe must be designed with sufficient wall thickness, or must be installed with adequate protection, to withstand anticipated external pressures and loads that will be imposed on the pipe after installation.

192.105 Design formula for steel pipe.

(a) The design pressure for steel pipe is determined in accordance with the following formula:

$$P = \frac{2 St}{D} \times F \times E \times T$$

P=Design pressure in pounds per square inch gage.

S=Yield strength in pounds per square inch determined in accordance with 192.107.

D=Nominal outside diameter of the pipe in inches.

t=Nominal wall thickness of the pipe in inches.

If this is unknown, it is determined in accordance with 192.109. Additional wall thickness required for concurrent external loads in accordance with 192.103 may not be included in computing design pressure.

F=Design factor determined in accordance with 192.111.

E=Longitudinal joint factor determined in accordance with 192.113.

T=Temperature derating factor determined in accordance with 192.115.

(b) If steel pipe that has been cold worked to meet the SMYS is heated, other than by welding, to 600° F. or more, the design pressure is limited to 75 percent of the pressure determined under paragraph (a) of this section.

192.107 Yield strength (S) for steel pipe.

(a) For pipe that is manufactured in accordance with a specification listed in section I of Appendix B of this part, the yield strength to be used in the design formula in 192.105 is the SMYS stated in the listed specification, if that value is known.

(b) For pipe that is manufactured in accordance with a specification not listed in section I of Appendix B to this part or whose specification or tensile properties are unknown, the yield strength to be used in the design formula in 192.105 is one of the following:

(1) If the pipe is tensile tested in accordance with section II-D of Appendix B to this part, the lower of the following:

(i) 80 percent of the average yield strength determined by the tensile tests.

(ii) The lowest yield strength determined by the tensile tests, but not more than 52,000 p.s.i.
(2) If the pipe is not tensile tested as provided in subparagraph (1) of this paragraph, 24,000 p.s.i.

192.109 Nominal wall thickness (t) for steel pipe.

(a) If the nominal wall thickness for steel pipe is not known, it is determined by measuring the thickness of each piece of pipe at quarter points on one end.

(b) However, if the pipe is of uniform grade, size, and thickness and there are more than 10 lengths, only 10 percent of the individual lengths, but not less than 10 lengths, need be measured. The thickness of the lengths that are not measured must be verified by applying a gage set to the minimum thickness found by the measurement. The nominal wall thickness to be used in the design formula in 192.105 is the next wall thickness found in commercial specifications that is below the average of all the measurements taken. However, the nominal wall thickness used may not be more than 1.14 times the smallest measurement taken on pipe less than 20 inches in outside diameter, nor more than 1.11 times the smallest measurement taken on pipe 20 inches or more in outside diameter.

192.111 Design factor (F) for steel pipe.

(a) Except as otherwise provided in paragraphs (b), (c), and (d) of this section, the design factor to be used in the design formula in 192.105 is determined in accordance with the following table:

Class location	Design factor (F)
1	0.72
2	0.60
3	0.50
4	0.40

(b) A design factor of 0.60 or less must be used in the design formula in 192.105 for steel pipe in Class 1 locations that:

(1) Crosses the right-of-way of an unimproved public road, without a casing;

(2) Crosses without a casing, or makes a parallel encroachment on, the right-of-way of either a hard surfaced road, a highway, a public street, or a railroad;

(3) Is supported by a vehicular, pedestrian, railroad, or pipeline bridge; or

(4) Is used in a fabricated assembly, (including separators, mainline valve assemblies, cross-connections, and river crossing headers) or is used

within five pipe diameters in any direction from the last fitting of a fabricated assembly, other than a transition piece or an elbow used in place of a pipe bend which is not associated with a fabricated assembly.

(c) For Class 2 locations, a design factor of 0.50, or less, must be used in the design formula in 192.105 for uncased steel pipe that crosses the right-of-way of a hard surfaced road, a highway, a public street, or a railroad.

(d) For Class 1 and Class 2 locations, a design factor of 0.50, or less, must be used in the design formula in 192.105 for--

- (1) Steel pipe in a compressor station, regulating station, or measuring station; and
- (2) Steel pipe, including a pipe riser, on a platform located offshore or in inland navigable waters.

192.113 Longitudinal joint factor (E) for steel pipe.

The longitudinal joint factor to be used in the design formula in 192.105 is determined in accordance with the following table:

Specification	Pipe Class	Longitudinal joint factor (E)
ASTM A 53	Seamless	1.00
	Electric resistance welded	1.00
	Furnace butt welded	.60
ASTM A 106	Seamless	1.00
ASTM A 134	Electric fusion arc welded	.80
ASTM A 135	Electric resistance welded	1.00
ASTM A 139	Electric fusion welded	.80
ASTM A 155	Electric fusion arc welded	1.00
ASTM A 211	Spiral welded steel pipe	.80
ASTM A 333	Seamless	1.00
	Electric resistance welded	1.00
ASTM A 381	Double submerged arc welded	1.00
	Electric resistance welded	1.00
API 5 L	Seamless	1.00
	Electric resistance welded	1.00
	Electric flash welded	1.00
	Submerged arc welded	1.00
	Furnace butt welded	.60
API 5 LX	Seamless	1.00
	Electric resistance welded	1.00
	Electric flash welded	1.00
API 5 LS	Submerged arc welded	1.00
	Electric resistance welded	1.00
	Submerged arc welded	1.00
Other	Pipe over 4 inches	.80
Other	Pipe 4 inches or less	.60

If the type of longitudinal joint cannot be determined, the joint factor to be used must not exceed that designated for "Other".

192.115 Temperature derating factor (T) for steel pipe.

The temperature derating factor to be used in the design formula in 192.105 is determined as follows:

Gas Temperature in degrees Fahrenheit	Temperature derating factor (T)
250 or less	1.000
300	0.967
350	0.933
400	0.900
450	0.867

For intermediate gas temperatures, the derating factor is determined by interpolation.

192.117 Design of cast iron pipe.

Cast iron pipe must be designed in accordance with ANSI A 21.1 using the following values for S (bursting tensile strength) and R (modulus of rupture) in the design equations:

Specification	Type of pipe	S	R
		psi	psi
ANSI A 21.3	Pit cast	11,000	31,000
ANSI A 21.7	Centrifugal (metal mold).	18,000	40,000
ANSI A 21.9	Centrifugal (sand-lined mold).	18,000	40,000

192.119 Design of ductile iron pipe.

(a) Ductile iron pipe must be designed in accordance with ANSI A 21.50 using the following values in the design equations:

s (design hoop stress)=16,800 p.s.i.

f (design bending stress)=36,000 p.s.i.

(b) Ductile iron pipe must be grade (60-42-10) and must conform to the requirements of ANSI A 21.52.

192.121 Design of plastic pipe.

The design pressure for plastic pipe is determined in accordance with the following formula, subject to the limitation of 192.123.

$$P = 2S \frac{t}{(D-t)} \times 0.32$$

P=Design pressure, gage, KPa (psi).

S=For thermoplastic pipe the long-term hydrostatic strength determined in accordance with the listed specifi-

cation at a temperature equal to 23°C (73°F), 38°C (100°F), 49°C (120°F), or 60°C (140°F); for reinforced thermosetting plastic pipe, 75,800 kPa (11,000 psi)

192.123 Design limitations for plastic pipe.

(a) The design pressure may not exceed a gage pressure of 689 kPa (100 p.s.i.g.) for plastic pipe used in —

- (1) Distribution systems; or
- (2) Class 3 and 4 locations.

(b) Plastic pipe may not be used where operating temperature of the pipe will be:

- (1) Below minus 29°C (-20°F); or
- (2) In the case of thermoplastic pipe, above the temperature at which the long-term hydrostatic strength used in the design formula under 192.121 is determined, except that pipe manufactured before May 18, 1978, may be used at temperatures up to 38°C (100°F); or in the case of reinforced thermosetting plastic pipe, above 66°C (150°F).

(c) The wall thickness for thermoplastic pipe may not be less than 1.57 millimeters (0.062 in.).

(d) The wall thickness for reinforced thermoset-

ting plastic pipe may not be less than that listed in the following table:

Nominal Size in inches	Minimum wall thickness in mm / inches
2 -----	1.52 (0.060)
3 -----	1.52 (0.060)
4 -----	1.78 (0.070)
6 -----	2.54 (0.100)

192.125 Design of copper pipe.

(a) Copper pipe used in mains must have a minimum wall thickness of 0.065 inches and must be hard drawn.

(b) Copper pipe used in service lines must have a minimum wall thickness as specified for type "L" pipe in ASTM B 88.

(c) Copper pipe used in mains and service lines may not be used at pressures in excess of 100 p.s.i.g.

(d) Copper pipe that does not have an internal corrosion resistant lining may not be used to carry gas that has an average hydrogen sulfide content of more than 0.3 grains per 100 standard cubic feet of gas.

Subpart D—Design of Pipeline Components

192.141 Scope

This subpart prescribes minimum requirements for the design and installation of pipeline components and facilities. In addition, it prescribes requirements relating to protection against accidental overpressuring.

192.143 General

Each component of a pipeline must be able to withstand operating pressures and other anticipated loadings with unit stresses equivalent to those allowed for comparable material in pipe in the same location and kind of service.

192.145 Valves

(a) Each valve must meet the minimum requirements, or the equivalent of API6A, API6D, MSS SP-70, MSS SP-71 or MSS SP-78, except that a valve designed before July 1, 1976, may meet the minimum requirements of MSS SP-52. A valve may not be used under operating conditions that exceed the applicable pressure-temperature ratings contained in those standards.

(b) Each valve must be able to meet the anticipated operating conditions.

(c) No valve having shell components made of ductile iron may be used at pressures exceeding 80 percent of the pressure ratings for comparable steel valves at their listed temperature. However, a valve having shell components made of ductile iron may be used at pressures up to 80 percent of the pressure ratings for comparable steel valves at their listed temperature, if:

(1) The temperature-adjusted service pressure does not exceed 1,000 p.s.i.g.; and

(2) Welding is not used on any ductile iron component in the fabrication of the valve shells or their assembly.

(d) No valve having pressure containing parts made of ductile iron may be used in the gas pipe components of compressor stations.

192.147 Flanges and flange accessories.

(a) General requirements. Each flange or flange accessory must meet the minimum requirements of ANSI B16.5, MSS SP-44, or ANSI B16.24, or the equivalent.

(b) Each flange assembly must be able to withstand the maximum pressure at which the pipeline is to be operated and to maintain its physical and chemical properties at any temperature to

which it is anticipated that it might be subjected in service.

192.149 Standard fittings.

(a) The minimum metal thickness of threaded fittings may not be less than specified for the pressures and temperatures in the applicable standards referenced in this part, or their equivalent.

(b) Each steel butt-welding fitting must have pressure and temperature ratings based on stresses for pipe of the same or equivalent material. The actual bursting strength of the fitting must at least equal the computed bursting strength of pipe of the designated material and wall thickness, as determined by a prototype that was tested to at least the pressure required for the pipeline to which it is being added.

192.151 Tapping

(a) Each mechanical fitting used to make a hot tap must be designed for at least the operating pressure of the pipeline.

(b) Where a ductile iron pipe is tapped, the extent of full-thread engagement and the need for the use of outside-sealing service connections, tapping saddles, or other fixtures must be determined by service conditions.

(c) Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except that:

(1) Existing taps may be used for replacement service, if they are free of cracks and have good threads; and

(2) A 1¼-inch tap may be made in a 4-inch cast iron or ductile iron pipe, without reinforcement. However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6-inch or larger pipe.

192.153 Components fabricated by welding.

(a) Except for branch connections and assemblies of standard pipe and fittings joined by circumferential welds, the design pressure of each component fabricated by welding, whose strength cannot be determined, must be established in accordance with paragraph UG-101 of section VIII of the ASME Boiler and Pressure Vessel Code.

(b) Each prefabricated unit that uses plate and longitudinal seams must be designated, constructed, and tested in accordance with the ASME Boiler and Pressure Vessel Code, except for the following:

- (1) Regularly manufactured butt-welding fittings.
- (2) Pipe that has been produced and tested under a specification listed in Appendix B to this part.
- (3) Partial assemblies such as split rings or collars.
- (4) Prefabricated units that the manufacturer certifies have been tested to at least twice the maximum pressure to which they will be subjected under the anticipated operating conditions.

(c) Orange-peek bull plugs and orange-peel swages may not be used on pipelines that are to operate at a hoop stress of 20 percent or more of the SMYS of the pipe.

(d) Except for flat closures designed in accordance with section VIII of the ASME Boiler and Pressure Code, flat closures and fish tails may not be used on pipe that either operates at 100 p.s.i.g., or more, or is more than 3 inches nominal diameter.

192.155 Welded branch connections.

Each welded branch connection made to pipe in the form of a single connection, or in a header or manifold as a series of connections, must be designed to ensure that the strength of the pipeline system is not reduced, taking into account the stresses in the remaining pipe wall due to the opening in the pipe or header, the shear stresses produced by the pressure acting on the area of the branch opening, and any external loadings due to thermal movement, weight, and vibration.

192.157 Extruded outlets.

Each extruded outlet must be suitable for anticipated service conditions and must be at least equal to the design strength of the pipe and other fittings in the pipeline to which it is attached.

192.159 Flexibility

Each pipeline must be designed with enough flexibility to prevent thermal expansion or contraction from causing excessive stresses in the pipe or components, excessive bending or unusual loads at joints, or undesirable forces or moments at points of connection to equipment, or at anchorage or guide points.

192.161 Supports and anchors.

(a) Each pipeline and its associated equipment must have enough anchors or supports to:

- (1) Prevent undue strain on connected equipment;
- (2) Resist longitudinal forces caused by a bend or offset in the pipe; and
- (3) Prevent or damp out excessive vibration.

(b) Each exposed pipeline must have enough supports or anchors to protect the exposed pipe

joints from the maximum end force caused by internal pressure and any additional forces caused by temperature expansion or contraction or by the weight of the pipe and its contents.

(c) Each support or anchor on an exposed pipeline must be made of durable, noncombustible material and must be designed and installed as follows:

(1) Free expansion and contraction of the pipeline between supports or anchors may not be restricted.

(2) Provision must be made for the service conditions involved.

(3) Movement of the pipeline may not cause disengagement of the support equipment.

(d) Each support on an exposed pipeline operated at a stress level of 50 percent or more of SMYS must comply with the following:

(1) A structural support may not be welded directly to the pipe.

(2) The support must be provided by a member that completely encircles the pipe.

(3) If an encircling member is welded to a pipe, the weld must be continuous and cover the entire circumference.

(e) Each underground pipeline that is connected to a relatively unyielding line or other fixed object must have enough flexibility to provide for possible movement, or it must have an anchor that will limit the movement of the pipeline.

(f) Except for offshore pipelines, each underground pipeline that is being connected to new branches must have a firm foundation for both the header and the branch to prevent lateral and vertical movement.

192.163 Compressor stations; design and construction.

(a) Location of compressor building. Except for a compressor building on a platform located offshore or in inland navigable waters, each main compressor building of a compressor station must be located on property under the control of the operator. It must be far enough away from adjacent property, not under control of the operator, to minimize the possibility of fire being communicated to the compressor building from structures on adjacent property. There must be enough open space around the main compressor building to allow the free movement of fire-fighting equipment.

(b) **Building construction.** Each building on a compressor station site must be made of noncombustible materials if it contains either:

- (1) Pipe more than 2 inches in diameter that is carrying gas under pressure; or
- (2) Gas handling equipment other than gas utilization equipment used for domestic purposes.

(c) **Exits.** Each operating floor of a main compressor building must have at least two separated and unobstructed exits located so as to provide a convenient possibility of escape and an unobstructed passage to a place of safety. Each door latch on an exit must be of a type which can be readily opened from the inside without a key. Each swinging door located in an exterior wall must be mounted to swing outward.

(d) **Fenced areas.** Each fence around a compressor station must have at least two gates located so as to provide a convenient opportunity for escape to a place of safety, or have other facilities affording a similarly convenient exit from the area. Each gate located within 200 feet of any compressor plant building must open outward and, when occupied, must be openable from the inside without a key.

(e) **Electrical facilities.** Electrical equipment and wiring installed in compressor stations must conform to the National Electrical Code, ANSI Standard C1, so far as that code is applicable.

192.165 Compressor stations: liquid removal.

(a) Where entrained vapors in gas may liquefy under the anticipated pressure and temperature conditions, the compressor must be protected against the introduction of those liquids in quantities that could cause damage.

(b) Each liquid separator used to remove entrained liquids at a compressor station must:

- (1) Have a manually operable means of removing these liquids.
- (2) Where slugs of liquid could be carried into the compressors, have either automatic liquid removal facilities, an automatic compressor shutdown device, or a high liquid level alarm; and
- (3) Be manufactured in accordance with section VIII of the ASME Boiler and Pressure Vessel Code, except that liquid separators constructed of pipe and fittings without internal welding must be fabricated with a design factor of 0.4, or less.

192.167 Compressor station: emergency shutdown.

(a) Except for unattended field compressor stations of 1,000 horsepower or less, each compressor station must have an emergency shutdown system that meets the following:

- (1) It must be able to block gas out of the station and blow down the station piping.

(2) It must discharge gas from the blowdown piping at a location where the gas will not create a hazard.

(3) It must provide means for the shutdown of gas compressing equipment, gas fires, and electrical facilities in the vicinity of gas headers and in the compressor building except, that:

(i) Electrical circuits that supply emergency lighting required to assist station personnel in evacuating the compressor building and the area in the vicinity of the gas headers must remain energized; and

(ii) Electrical circuits needed to protect equipment from damage may remain energized.

(4) It must be operable from at least two locations, each of which is:

(i) Outside the gas area of the station;

(ii) Near the exit gates, if the station is fenced, or near emergency exits, if not fenced; and

(iii) Not more than 500 feet from the limits of the station.

(b) If a compressor station supplies gas directly to a distribution system with no other adequate source of gas available, the emergency shutdown system must be designed so that it will not function at the wrong time and cause the unintended outage on the distribution system.

(c) On a platform located offshore or in inland navigable waters, the emergency shutdown system must be designed and installed to actuate automatically by each of the following events:

(1) In the case of an unattended compressor station--

(i) When the gas pressure equals the maximum allowable operating pressure plus 15 percent; or

(ii) When an uncontrolled fire occurs on the platform; and

(2) In the case of a compressor station in a building--

(i) When an uncontrolled fire occurs in the building; or

(ii) When the concentration of gas in air reaches 50 percent or more of the lower explosive limit in a building which has a source of ignition.

For the purpose of paragraph (c) (2) (ii) of this section, an electrical facility which conforms to Class 1, Group D of the National Electrical Code is not a source of ignition.

192.169 Compressor stations; pressure limiting devices.

(a) Each compressor station must have pressure relief or other suitable protective devices of sufficient capacity and sensitivity to ensure that the maximum allowable operating pressure of the station piping and equipment is not exceeded by more than 10 percent.

(b) Each vent line that exhausts gas from the pressure relief valves of a compressor station must extend to a location where the gas may be discharged without hazard.

192.171 Compressor stations; additional safety equipment.

(a) Each compressor station must have adequate fire protection facilities. If fire pumps are a part of these facilities, their operation may not be affected by the emergency shutdown system.

(b) Each compressor station prime mover, other than an electrical induction or synchronous motor, must have an automatic device to shut down the unit before the speed of either the prime mover or the driven unit exceeds a maximum safe speed.

(c) Each compressor unit in a compressor station must have a shutdown or alarm device that operates in the event of inadequate cooling or lubrication of the unit.

(d) Each compressor station gas engine that operates with pressure gas injection must be equipped so that stoppage of the engine automatically shuts off the fuel and vents the engine distribution manifold.

(e) Each muffler for a gas engine in a compressor station must have vent slots or holes in the baffles of each compartment to prevent gas from being trapped in the muffler.

192.173 Compressor stations; ventilation.

Each compressor station building must be ventilated to ensure that employees are not endangered by the accumulation of gas in rooms, sumps, attics, pits, or other enclosed places.

192.175 Pipe-type and bottle-type holders.

(a) Each pipe-type and bottle-type holder must be designed so as to prevent the accumulation of liquids in the holder, in connecting pipe, or in auxiliary equipment, that might cause corrosion or interfere with the safe operation of the holder.

(b) Each pipe-type or bottle-type holder must have minimum clearance from other holders in accordance with the following formula:

$$C = \frac{3 D \times P \times F}{1,000}$$

in which:

C=Minimum clearance between pipe containers or bottles in inches.

D=Outside diameter of pipe containers or bottles in inches.

P=Maximum allowable operating pressure, p.s.i.g.

F=Design factor as set forth in 192.111 of this part.

192.177 Additional provisions for bottle-type holders.

(a) Each bottle-type holder must be:

(1) Located on a storage site entirely surrounded by fencing that prevents access by unauthorized persons and with minimum clearance from the fence as follows:

Maximum allowable operating pressure	Minimum clearance (feet)
Less than 1,000 p.s.i.g. -----	25
1,000 p.s.i.g. or more -----	100

(2) Designed using the design factors set forth in 192.111; and

(3) Buried with a minimum cover in accordance with 192.327.

(b) Each bottle-type holder manufactured from steel that is not weldable under field conditions must comply with the following:

(1) A bottle-type holder made from alloy steel must meet the chemical and tensile requirements for the various grades of steel in either API Standard 5A or ASTM A 372.

(2) The actual yield-tensile ratio of the steel may not exceed 0.85.

(3) Welding may not be performed on the holder after it has been heat treated or stress relieved, except that copper wires may be attached to the small diameter portion of the bottle end closure for cathodic protection if a localized thermit welding process is used.

(4) The holder must be given a mill hydrostatic test at a pressure that produces a hoop stress at least equal to 85 percent of the SMYS.

(5) The holder, connection pipe, and components must be leak tested after installation as required by Subpart J of this part.

192.179 Transmission line valves.

(a) Each transmission line, other than offshore segments, must have sectionalizing block valves spaced as follows:

(1) Each point on the pipeline in a Class 4 location must be within 2½ miles of a valve.

(2) Each point on the pipeline in a Class 3 location must be within 4 miles of a valve.

(3) Each point on the pipeline in a Class 2 location must be within 7½ miles of a valve.

(4) Each point on the pipeline in a Class 1 location must be within 10 miles of a valve.

(b) Each sectionalizing block valve on a transmission line, other than offshore segments, must comply with the following:

(1) The valve and the operating device to open or close the valve must be readily accessible and protected from tampering and damage.

(2) The valve must be supported to prevent settling of the valve or movement of the pipe to which it is attached.

(c) Each section of a transmission line other than offshore segments between main line valves must have a blowdown valve with enough capacity to allow the transmission line to be blown down as rapidly as practicable. Each blowdown discharge must be located so the gas can be blown to the atmosphere without hazard and, if the transmission line is adjacent to an overhead electric line, so that the gas is directed away from the electrical conductors.

(d) Offshore segments of transmission lines must be equipped with valves or other components to shut off the flow of gas to an offshore platform in an emergency.

192.181 Distribution line valves.

(a) Each high-pressure distribution system must have valves spaced so as to reduce the time to shut down a section of main in an emergency. The valve spacing is determined by the operating pressure, the size of the mains, and the local physical conditions.

(b) Each regulator station controlling the flow or pressure of gas in a distribution system must have a valve installed on the inlet piping at a distance from the regulator station sufficient to permit the operation of the valve during an emergency that might preclude access to the station.

(c) Each valve on a main installed for operating or emergency purposes must comply with the following:

(1) The valve must be placed in a readily accessible location so as to facilitate its operation in an emergency.

(2) The operating stem or mechanism must be readily accessible.

(3) If the valve is installed in a buried box or enclosure, the box or enclosure must be installed so as to avoid transmitting external loads to the main.

192.183 Vaults; structural design requirements.

(a) Each underground vault or pit for valves, pressure relieving, pressure limiting, or pressure regulating stations, must be able to meet the loads which may be imposed upon it, and to protect installed equipment.

(b) There must be enough working space so that all of the equipment required in the vault or pit can be properly installed, operated, and maintained.

(c) Each pipe entering, or within, a regulator vault or pit must be steel for sizes 10 inches, and less, except that control and gage piping may be copper. Where pipe extends through the vault or pit structure, provision must be made to prevent the passage of gasses or liquids through the opening and to avert strains in the pipe.

192.185 Vaults; accessibility.

Each vault must be located in an accessible location and, so far as practical, away from:

(a) Street intersections or points where traffic is heavy or dense;

(b) Points of minimum elevation, catch basins, or places where the access cover will be in the course of surface waters; and

(c) Water, electric, steam, or other facilities.

192.187 Vaults; sealing, venting, and ventilation.

Each underground vault or closed top pit containing either a pressure regulating or reducing station, or a pressure limiting or relieving station, must be sealed, vented or ventilated, as follows:

(a) When the internal volume exceeds 200 cubic feet:

(1) The vault or pit must be ventilated with two ducts, each having at least the ventilating effect of a pipe 4 inches in diameter;

(2) The ventilation must be enough to minimize the formation of combustible atmosphere in the vault or pit; and

(3) The ducts must be high enough above grade to disperse any gas-air mixtures that might be discharged.

(b) When the internal volume is more than 75 cubic feet but less than 200 cubic feet:

(1) If the vault or pit is sealed, each opening must have a tight fitting cover without open holes through which an explosive mixture might be ignited, and there must be a means for testing the internal atmosphere before removing the cover.;

(2) If the vault or pit is vented, there must be a means of preventing external sources of ignition from reaching the vault atmosphere; or

(3) If the vault or pit is ventilated, paragraph (a) or (c) of this section applies.

(c) If a vault or pit covered by paragraph (b) of this section is ventilated by openings in the covers or gratings and the ratio of the internal

volume, in cubic feet, to the effective ventilating area of the cover or grating, in square feet, is less than 20 to 1, no additional ventilation is required.

192.189 Vaults; drainage and waterproofing.

(a) Each vault must be designed so as to minimize the entrance of water.

(b) A vault containing gas piping may not be connected by means of a drain connection to any other underground structure.

(c) All electrical equipment in vaults must conform to the applicable requirements of Class 1, Group D, of the National Electrical Code, ANSI Standard C1.

192.191 Design pressure of plastic fittings.

(a) Thermosetting fittings for plastic pipe must conform to ASTM D 2517.

(b) The design pressure of acrylonitrile-butadiene-styrene (ABS) and polyvinyl chloride (PVC) Schedule 40 and 80 thermoplastic fittings must be obtained from the following table:

DESIGN PRESSURE OF THERMOPLASTIC FITTINGS, P.S.I.G. OF VARIOUS STRENGTHS, MATERIALS AND CLASS LOCATIONS

Size inches	Schedule	ABS Type I and PVC Type II class location			PVC Type I class location		
		1	2 and 3	4	1	2 and 3	4
½	40	100	100	100	100	100	100
	80	100	100	100	100	100	100
¾	40	100	100	96	100	100	100
	80	100	100	100	100	100	100
1	40	100	100	90	100	100	100
	80	100	100	100	100	100	100
1¼	40	100	92	74	100	100	100
	80	100	100	100	100	100	100
1½	40	100	83	66	100	100	100
	80	100	100	94	100	100	100
2	40	89	69	55	100	100	100
	80	100	100	81	100	100	100
2½	40	99	76	61	100	100	100
	80	100	100	85	100	100	100
3	40	84	66	53	100	100	100
	80	100	94	75	100	100	100
3½	40	77	60	48	100	100	96
	80	100	86	69	100	100	100
4	40	71	56	44	100	100	80
	80	100	81	65	100	100	100
5	40	62	49	39	100	97	78
	80	93	72	58	100	100	100
6	40	56	44	35	100	88	71
	80	89	70	56	100	100	100

192.193 Valve installation in plastic pipe.

Each valve installed in plastic pipe must be designed so as to protect the plastic material against excessive torsional or shearing loads when the valve or shutoff is operated, and from any other secondary stresses that might be exerted through the valve or its enclosure.

192.195 Protection against accidental overpressuring.

(a) **General requirements.** Except as provided in 192.197, each pipeline that is connected to a gas source so that the maximum allowable operating pressure could be exceeded as the result of pressure control failure or of some other type of failure, must have pressure relieving or pressure limiting devices that meet the requirements of 192.199 and 192.201.

(b) **Additional requirements for distribution systems.** Each distribution system that is supplied from a source of gas that is at a higher pressure than the maximum allowable operating pressure for the system must:

- (1) Have pressure regulation devices capable of meeting the pressure, load, and other service conditions that will be experienced in normal operation of the system, and that could be activated in the event of failure of some portion of the system; and
- (2) Be designed so as to prevent accidental overpressuring.

192.197 Control of pressure of gas delivered from high pressure distribution systems.

(a) If the maximum actual operating pressure of the distribution system is under 60 p.s.i.g. and a service regulator having the following characteristics is used, no other pressure limiting device is required:

- (1) A regulator capable of reducing distribution line pressure to pressures recommended for household appliances.
- (2) A single port valve with proper orifice for the maximum gas pressure at the regulator inlet.
- (3) A valve seat made of resilient material designed to withstand abrasion of the gas, impurities in gas, cutting by the valve, and to resist permanent deformation when it is pressed against the valve port.
- (4) Pipe connections to the regulator not exceeding 2 inches in diameter.
- (5) A regulator that, under normal operating conditions, is able to regulate

the downstream pressure within the necessary limits of accuracy and to limit the build-up of pressure under no-flow conditions to prevent a pressure that would cause the unsafe operation of any connected and properly adjusted gas utilization equipment.

(6) A self-contained service regulator with no external static or control lines.

(b) If the maximum actual operating pressure of the distribution system is 60 p.s.i.g., or less, and a service regulator that does not have all of the characteristics listed in paragraph (a) of this section is used, or if the gas contains materials that seriously interfere with the operation of service regulators, there must be suitable protective devices to prevent unsafe overpressuring of the customer's appliances if the service regulator fails.

(c) If the maximum actual operating pressure of the distribution system exceeds 60 p.s.i.g., one of the following methods must be used to regulate and limit, to the maximum safe value, the pressure of gas delivered to the customer:

(1) A service regulator having the characteristics listed in paragraph (a) of this section, and another regulator located upstream from the service regulator. The upstream regulator may not be set to maintain a pressure higher than 60 p.s.i.g. A device must be installed between the upstream regulator and the service regulator to limit the pressure on the inlet of the service regulator to 60 p.s.i.g. or less in case the upstream regulator fails to function properly. This device may be either a relief valve or an automatic shutoff that shuts, if the pressure on the inlet of the service regulator exceeds the set pressure (60 p.s.i.g. or less), and remains closed until manually reset.

(2) A service regulator and a monitoring regulator set to limit, to a maximum safe value, the pressure of the gas delivered to the customer.

(3) A service regulator with a relief valve vented to the outside atmosphere, with the relief valve set to open so that the pressure of gas going to the customer

does not exceed a maximum safe value. The relief valve may either be built into the service regulator or it may be a separate unit installed downstream from the service regulator. This combination may be used alone only in those cases where the inlet pressure on the service regulator does not exceed the manufacturer's safe working pressure rating of the service regulator, and may not be used where the inlet pressure on the service regulator exceeds 125 p.s.i.g. For higher inlet pressures, the methods in subparagraph (1) or (2) of this paragraph must be used.

(4) A service regulator and an automatic shutoff device that closes upon a rise in pressure downstream from the regulator and remains closed until manually reset.

192.199 Requirements for design of pressure relief and limiting devices.

Except for rupture discs, each pressure relief or pressure limiting device must:

(a) Be constructed of materials such that the operation of the device will not be impaired by corrosion;

(b) Have valves and valve seats that are designed not to stick in a position that will make the device inoperative;

(c) Be designed and installed so that it can be readily operated to determine if the valve is free, can be tested to determine the pressure at which it will operate, and can be tested for leakage when in the closed position;

(d) Have support made of noncombustible material;

(e) Have discharge stacks, vents, or outlet ports designed to prevent accumulation of water, ice, or snow, located where gas can be discharged into the atmosphere without undue hazard;

(f) Be designed and installed so that the size of the openings, pipe, and fittings located between the system to be protected and the pressure relieving device, and the size of the vent line, are adequate to prevent hammering of the valve and to prevent impairment of relief capacity;

(g) Where installed at a district regulator station to protect a pipeline system from overpressuring, be designed and installed to prevent any single incident such as an explosion in a vault or damage by a vehicle from affecting the operation of both the overpressure protective device and the district regulator; and

(h) Except for a valve that will isolate the system under protection from its source of pressure,

be designed to prevent unauthorized operation of any stop valve that will make the pressure relief valve or pressure limiting device inoperative.

192.201 Required capacity of pressure relieving and limiting stations.

(a) Each pressure relief station or pressure limiting station or group of those stations installed to protect a pipeline must have enough capacity, and must be set to operate, to insure the following:

(1) In a low pressure distribution system, the pressure may not cause the unsafe operation of any connected and properly adjusted gas utilization equipment.

(2) In pipelines other than a low pressure distribution system:

(i) If the maximum allowable operating pressure is 60 p.s.i.g. or more, the pressure may not exceed the maximum allowable operating pressure plus 10 percent, or the pressure that produces a hoop stress of 75 percent of SMYS, whichever is lower;

(ii) If the maximum allowable operating pressure is 12 p.s.i.g. or more, but less than 60 p.s.i.g., the pressure may not exceed the maximum allowable operating pressure plus 6 p.s.i.g.; or

(iii) If the maximum allowable operating pressure is less than 12 p.s.i.g., the pressure may not exceed the maximum allowable operating pressure plus 50 percent.

(b) When more than one pressure regulating or compressor station feeds into a pipeline, relief valves or other protective devices must be installed at each station to ensure that the complete failure of the largest capacity regulator or compressor, or any single run of lesser capacity regulators or compressors in that station, will not impose pressures on any part of the pipeline or distribution system in excess of those for which it was designed, or against which it was protected, whichever is lower.

(c) Relief valves or other pressure limiting devices must be installed at or near each regulator station in a low-pressure distribution system, with a capacity to limit the maximum pressure in the main to a pressure that will not exceed the safe operating pressure for any connected and properly adjusted gas utilization equipment.

192.203 Instrument, control, and sampling pipe and components.

(a) **Applicability.** This section applies to the design of instrument, control and sampling pipe and components. It does not apply to permanently closed systems, such as fluid-filled temperature-responsive devices.

(b) **Materials and design.** All materials employed for pipe and components must be designed to meet the particular conditions of service and the following:

(1) Each takeoff connection and attaching boss, fitting, or adapter must be made of suitable material, be able to withstand the maximum service pressure and temperature of the pipe or equipment to which it is attached, and be designed to satisfactorily withstand all stresses without failure by fatigue.

(2) A shutoff valve must be installed in each takeoff line as near as practicable to the point of takeoff. Blowdown valves must be installed where necessary.

(3) Brass or copper material may not be used for metal temperatures greater than 400° F.

(4) Pipe or components that may contain liquids must be protected by heating or other means from damage due to freezing.

(5) Pipe or components in which liquids may accumulate must have drains or drips.

(6) Pipe or components subject to clogging from solids or deposits must have suitable connections for cleaning.

(7) The arrangement of pipe, components, and supports must provide safety under anticipated operating stresses.

(8) Each joint between sections of pipe, and between pipe and valves or fittings, must be made in a manner suitable for the anticipated pressure and temperature condition. Slip type expansion joints may not be used. Expansion must be allowed for by providing flexibility within the system itself.

(9) Each control line must be protected from anticipated causes of damage and must be designed and installed to prevent damage to any one control line from making both the regulator and the over-pressure protective device inoperative.

Subpart E—Welding of Steel in Pipelines

192.221 Scope

(a) This subpart prescribes minimum requirements for welding steel materials in pipelines.

(b) This subpart does not apply to welding that occurs during the manufacture of steel pipe or steel pipeline components.

192.223 General

(a) Welding must be performed in accordance with established written welding procedures that have been qualified under 192.225 to produce sound, ductile welds.

(b) Welding must be performed by welders who are qualified under 192.227 and 192.229 for the welding procedure to be used.

192.225 Qualification of welding procedures.

(a) Each welding procedure must be qualified under Section IX of the 1974 edition of the ASME Boiler and Pressure Vessel Code or Section 2 of the 1973 edition of API Standard 1104, whichever is appropriate to the function of the weld, except that a welding procedure qualified under Section IX of the 1968 edition of the ASME Boiler and Pressure Vessel Code before July 1, 1976, or Section 2 of the 1968 edition of API Standard 1104 before March 20, 1975, may continue to be used but may not be requalified under that edition.

(b) When a welding procedure is being qualified under Section IX of the ASME Boiler and Pressure Vessel Code, the following steels are considered to fall within the P-Number 1 grouping for the purpose of the essential variables and do not require separate qualification of welding procedures:

(1) Carbon steels that have a carbon content of 0.32 percent (ladle analysis) or less.

(2) Carbon steels that have a carbon equivalent ($C+\frac{1}{4}Mn$) of 0.65 percent (ladle analysis) or less.

(3) Alloy steels with weldability characteristics that have been shown to be similar to the carbon steels listed in subparagraphs (1) and (2) of this paragraph. Alloy steels and carbon steels that are not covered by subparagraph (1), (2), or (3) of this paragraph require separate qualification of procedures for each individual pipe specification in accordance with sections VIII and IX of the ASME Boiler and Pressure Vessel Code.

(c) Each welding procedure must be recorded in detail during the qualifying test. This record must be retained and followed whenever the procedure is used.

192.227 Qualification of welders.

(a) Except as provided in paragraph (c) of this section, each welder must be qualified in accordance with one of the following:

(1) Section IX of the 1974 edition of the ASME Boiler and Pressure Vessel Code or, if qualified before July 1, 1976, the 1968 edition, except that a welder may not requalify under the 1968 edition.

(2) The following editions of section 3 of API Standard 1104:

(i) The 1973 edition, except that a welder may be qualified by radiography under subsection 3.51 without regard for the standards in subsection 6.9 for depth of undercutting adjacent to the root bead unless that depth is visually determined by use of a depth measuring device on all undercutting along the entire circumference of the weld; or

(ii) If a welder is qualified before March 20, 1975, the 1968 edition, except that a welder may not requalify under the 1968 edition.

(b) When a welder is being qualified under section IX of the ASME Boiler and Pressure Vessel Code, the following steels are considered to fall within the P-Number 1 grouping for the purpose of the essential variables and do not require separate qualification:

(1) Carbon steels that have a carbon content of 0.32 percent (ladle analysis) or less.

(2) Carbon steels that have a carbon equivalent ($C+\frac{1}{4}Mn$) of 0.65 percent (ladle analysis) or less.

(3) Alloy steels with weldability characteristics that have been shown to be similar to the carbon steels listed in subparagraphs (1) and (2) of this paragraph.

Alloy steels and carbon steels that are not covered by subparagraphs (1), (2), or (3) of this paragraph require separate qualification of welders for each individual pipe specification in accordance with sections VIII and IX of the ASME Boiler and Pressure Vessel Code.

(c) A welder may qualify to perform welding on pipe to be operated at a pressure that produces a hoop stress of less than 20 percent of SMYS by performing an acceptable test weld, for the process to be used, under the test set forth in section I of Appendix C to this part. A welder who makes welded service line connections to mains must also perform an acceptable test weld under section II of

Appendix C to this part as a part of his qualifying test. After initial qualification, a welder may not perform welding unless—

(1) Within the preceding 12 calendar months, he has requalified; or

(2) Within the preceding 6 calendar months he has had—

(i) A production weld cut out, tested and found acceptable in accordance with the qualifying test; or—

(ii) For welders who work only on service lines 2 inches or smaller in diameter, two sample welds tested and found acceptable in accordance with the test in section III of Appendix C to this part.

192.229 Limitations on welders.

(a) No welder whose qualification is based on nondestructive testing may weld compressor station pipe and components.

(b) No welder may weld with a particular welding process unless, within the preceding 6 calendar months, he has engaged in welding with that process.

(c) A welder qualified under §192.227 (a) may not weld unless within the preceding 6 calendar months the welder has had one weld tested and found acceptable under—

(1) Section 3 or 6 of the 1973 edition of API Standard 1104, except for the standards in subsection 6.9 for depth of undercutting adjacent to the root bead unless that depth is visually determined by use of a depth measuring device on all undercutting along the entire circumference of the weld; or

(2) In the case of tests conducted before March 20, 1975, section 3 or 6 of the 1968 edition of API Standard 1104.

192.231 Protection from weather.

The welding operation must be protected from weather conditions that would impair the quality of the completed weld.

192.233 Miter joints.

(a) A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of 30 percent or more of SMYS may not deflect the pipe more than 3° .

(b) A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of less than 30 percent, but more than 10 percent, of SMYS may not deflect the pipe more than $12\frac{1}{2}^{\circ}$ and must be a distance equal to one pipe diameter or more away from any other miter joint, as measured from the crotch of each joint.

(c) A miter joint on steel pipe to be operated at

a pressure that produces a hoop stress of 10 percent or less of SMYS may not deflect the pipe more than 90° .

192.235 Preparation for welding.

Before beginning any welding, the welding surfaces must be clean and free of any material that may be detrimental to the weld, and the pipe or component must be aligned to provide the most favorable condition for depositing the root bead. This alignment must be preserved while the root bead is being deposited.

192.237 Preheating.

(a) Carbon steel that has a carbon content in excess of 0.32 percent (ladle analysis) or a carbon equivalent ($C+\frac{1}{4}Mn$) in excess of 0.65 percent (ladle analysis) must be preheated for welding.

(b) Carbon steel that has a lower carbon content or carbon equivalent than the steels covered by paragraph (a) of this section must be preheated for welding when preheating will alleviate existing conditions that would limit the welding technique or tend to adversely affect the quality of the weld.

(c) When steel materials with different preheat temperatures are being preheated for welding, the higher temperature must be used.

(d) Preheat temperature must be monitored to ensure that the required preheat temperature is reached before, and maintained during, the welding operation.

192.239 Stress relieving.

(a) Except as provided in paragraph (f) of this section, each weld on carbon steel that has a carbon content in excess of 0.32 percent (ladle analysis) or a carbon equivalent ($C+\frac{1}{4}Mn$) in excess of 0.65 percent (ladle analysis) must be stress relieved as prescribed in section VIII of the ASME Boiler and Pressure Vessel Code.

(b) Except as provided in paragraph (f) of this section, each weld on carbon steel that has a carbon content of less than 0.32 percent (ladle analysis) or a carbon equivalent ($C+\frac{1}{4}Mn$) of less than 0.65 percent (ladle analysis) must be thermally stress relieved when conditions exist which cool the weld at a rate detrimental to the quality of the weld.

(c) Except as provided in paragraph (f) of this section, each weld on carbon steel pipe with a wall thickness of more than $1\frac{1}{4}$ inches must be stress relieved.

(d) When a weld connects pipe or components that are of different thickness, the wall thickness

to be used in determining whether stress relieving is required under this section is:

(1) In the case of pipe connections, the thicker of the two pipes joined; or

(2) In the case of branch connections, slip-on flanges, or socket weld fittings, the thickness of the pipe run or header.

(e) Each weld of different materials must be stress relieved, if either material requires stress relieving under this section.

(f) Notwithstanding paragraphs (a), (b), and (c) of this section, stress relieving is not required for the following:

(1) A fillet or groove weld one-half inch, or less, in size (leg) that attaches a connection 2 inches, or less, in diameter; or

(2) A fillet or groove weld three-eighths inch, or less, in groove size that attaches a supporting member or other nonpressure attachment.

(g) Stress relieving required by this section must be performed at a temperature of at least 1,100° F. for carbon steels and at least 1,200° F. for ferritic alloy steels. When stress relieving a weld between steel materials with different stress relieving temperatures, the higher temperature must be used.

(h) When stress relieving, the temperature must be monitored to ensure that a uniform temperature is maintained and that the proper stress relieving cycle is accomplished.

192.241 Inspection and test of welds.

(a) Visual inspection of welding must be conducted to insure that—

(1) The welding is performed in accordance with the welding procedure; and

(2) The weld is acceptable under paragraph (c) of this section.

(b) The welds on a pipeline to be operated at a pressure that produces a hoop stress of 20 percent or more of SMYS must be nondestructively tested in accordance with § 192.243, except that welds that are visually inspected and approved by a qualified welding inspector need not be nondestructively tested if—

(1) The pipe has a nominal diameter of less than 6 inches; or

(2) The pipeline is to be operated at a pressure that produces a hoop stress of less than 40 percent of SMYS and the welds are so limited in number that nondestructive testing is impractical.

(c) The acceptability of a weld that is nondestructively tested or visually inspected is determined according to the standards in Section 6 of the 1973 edition of AFI Standard 1104. However, the standards in subsection 6.9 for depth of under-

cutting adjacent to the root bead apply only if—

(1) That depth is visually determined by use of a depth measuring device on all undercutting along the entire circumference of the weld; and

(2) Visual determination of internal undercutting is made in all pipe of the same diameter in a pipeline, except where impractical at tie-in welds.

192.243 Nondestructive testing.

(a) Nondestructive testing of welds must be performed by any process, other than trepanning, that will clearly indicate defects that may affect the integrity of the weld.

(b) Nondestructive testing of welds must be performed:

(1) In accordance with written procedures; and

(2) By persons who have been trained and qualified in the established procedures and with the equipment employed in testing.

(c) Procedures must be established for the proper interpretation of each nondestructive test of a weld to ensure the acceptability of the weld under 192.241 (c).

(d) When nondestructive testing is required under 192.241 (b), the following percentages of each day's field butt welds, selected at random by the operator, must be nondestructively tested over their entire circumference:

(1) In Class 1 locations, except offshore, at least 10 percent.

(2) In Class 2 locations, at least 15 percent.

(3) In Class 3 and Class 4 locations and at crossings of major or navigable rivers, and offshore, 100 percent if practicable, but not less than 90 percent.

(4) Within railroad or public highway rights-of-way, including tunnels, bridges and overhead road crossings, and at pipeline tie-ins, 100 percent.

(e) Except for a welder whose work is isolated from the principal welding activity, a sample of each welder's work for each day must be nondestructively tested, when nondestructive testing is required under 192.241 (b).

(f) When nondestructive testing is required under 192.241 (b), each operator must retain, for the life of the pipeline, a record showing by milepost, engineering station, or by geographic feature, the number of girth welds made, the number nondestructively tested, the number rejected, and the disposition of the rejects.

192.245 Repair or removal of defects.

(a) Each weld that is unacceptable under 192.241(c) must be removed or repaired. Except for welds on an offshore pipeline being installed from a pipelay vessel, a weld must be removed if it has a crack that is more than 2 inches long or that penetrates either the root or second bead.

(b) Each weld that is repaired must have the defect removed down to clean metal and the segment to be repaired must be preheated. After repair, the segment of the weld that was repaired must be inspected to ensure its acceptability. If the repair is not acceptable, the weld must be removed, except that additional repairs made in accordance with written welding procedures qualified under 192.225 are permitted for welds on an offshore pipeline being installed from a pipelay vessel.

Subpart F—Joining of Materials Other Than by Welding

192.271 Scope

(a) This subpart prescribes minimum requirements for joining materials in pipelines, other than by welding.

(b) This subpart does not apply to joining during the manufacture of pipe or pipeline components.

192.273 General

(a) The pipeline must be designed and installed so that each joint will sustain the longitudinal pull-out or thrust forces caused by contraction or expansion of the piping or by anticipated external or internal loading.

(b) Each joint must be made in accordance with written procedures that have been proven by test or experience to produce strong gas-tight joints.

(c) Each joint must be inspected to insure compliance with this subpart.

192.275 Cast iron pipe.

(a) Each caulked bell and spigot joint in cast iron pipe must be sealed with mechanical leak clamps.

(b) Each mechanical joint in cast iron pipe must have a gasket made of a resilient material as the sealing medium. Each gasket must be suitably confined and retained under compression by a separate gland or follower ring.

(c) Cast iron pipe may not be joined by threaded joints.

(d) Cast iron pipe may not be joined by brazing.

(e) Each flange on a flanged joint in cast iron pipe must conform in dimensions and drilling to ANSI Standard B16.1 and be cast integrally with the pipe, valve, or fitting.

192.277 Ductile iron pipe.

(a) Each mechanical joint in ductile iron pipe must conform to ANSI Standard A21.52 and ANSI Standard A21.11.

(b) Ductile iron pipe may not be joined by threaded joints.

(c) Ductile iron pipe may not be joined by brazing.

192.279 Copper pipe.

Copper pipe may not be threaded, except that copper pipe used for joining screw fittings or valves may be threaded if the wall thickness is equivalent to the comparable size of standard wall pipe, as defined in ANSI Standard B36.10.

192.281 Plastic Pipe.

(a) General. A plastic pipe joint that is joined by solvent cement, adhesive, or heat fusion may not be disturbed until it has properly set. Plastic pipe may not be joined by a threaded joint or miter joint.

(b) Solvent cement joints. Each solvent cement joint on plastic pipe must comply with the following:

(1) The mating surfaces of the joint must be clean, dry, and free of material which might be detrimental to the joint.

(2) The solvent cement must conform to ASTM Specification D2513.

(3) The safety requirements of Appendix A of ASTM Specification D2513 must be met.

(4) The joint may not be heated to accelerate the setting of the cement.

(c) Heat-fusion joints. Each heat-fusion joint on plastic pipe must comply with the following:

(1) A butt heat-fusion joint must be joined by a device that holds the heater element square to the ends of the piping, compresses the heated ends together, and holds the pipe in proper alignment while the plastic hardens.

(2) A socket heat-fusion joint must be joined by a device that heats the mating surfaces of the joint uniformly and simultaneously to essentially the same temperature.

(3) Heat may not be applied with a torch or other open flame.

(d) Adhesive joints. Each adhesive joint on plastic pipe must comply with the following:

(1) The adhesive must conform to ASTM Specification D2517.

(2) The materials and adhesive must be compatible with each other.

(e) Mechanical joints. Each compression type mechanical joint on plastic pipe must comply with the following:

(1) The gasket material in the coupling must be compatible with the plastic.

(2) A rigid internal tubular stiffener, other than a split tubular stiffener, must be used in conjunction with the coupling.

§192.283 Plastic pipe; qualifying joining procedures.

(a) Heat Fusion, Solvent Cement, and Adhesive Joints. Before any written procedure established under §192.273(b) is used for making plastic pipe joints by a heat fusion, solvent cement, or adhesive method, the procedure must be qualified by subjecting specimen joints made according to the procedure to the following tests:

- (1) The burst test requirements of Paragraph 8.6 (Sustained Pressure Test) or Paragraph 8.7 (Minimum Hydrostatic Burst Pressure) of ASTM D 2513,
- (2) For procedures intended for lateral pipe connections, subject a specimen joint made from pipe sections joined at right angles according to the procedure to a force on the lateral pipe until failure occurs in the specimen. If failure initiates outside the joint area, the procedure qualifies for use; and
- (3) For procedures intended for non-lateral pipe connections, follow the tensile test requirements of ASTM D 638, except that the test may be conducted at ambient temperature and humidity. If the specimen elongates no less than 25 percent or failure initiates outside the joint area, the procedure qualifies for use.

(b) Mechanical Joints. Before any written procedure established under §192.273(b) is used for making mechanical plastic pipe joints that are designed to withstand tensile forces, the procedure must be qualified by subjecting 5 specimen joints made according to the procedure to the following tensile test:

- (1) Use an apparatus for the test as specified in ASTM D 638-77a (except for conditioning).
- (2) The specimen must be of such length that the distance between the grips of the apparatus and the end of the stiffener does not affect the joint strength.
- (3) The speed of testing is 5.0 mm (0.20 in) per minute, plus or minus 25 percent.
- (4) Pipe specimens less than 102 mm (4 in) in diameter are qualified if the pipe yields to an elongation of no less than

25 percent or failure initiates outside the joint area.

(5) Pipe specimens 102 mm (4 in) and larger in diameter shall be pulled until the pipe is subjected to a tensile stress equal to or greater than the maximum thermal stress that would be produced by a temperature change of 55.6°C (100°F) or until the pipe is pulled from the fitting. If the pipe pulls from the fitting, the lowest value of the five test results or the manufacturer's rating, whichever is lower must be used in the design calculations for stress.

(6) Each specimen that fails at the grips must be retested using new pipe.

(7) Results obtained pertain only to the specific outside diameter, and material of the pipe tested, except that testing of a heavier wall pipe may be used to qualify pipe of the same material but with a lesser wall thickness.

(c) A copy of each written procedure being used for joining plastic pipe must be available to the persons making and inspecting joints.

(d) Pipe or fittings manufactured before July 1, 1980, may be used in accordance with procedures that the manufacturer certifies will produce a joint as strong as the pipe.

§192.285 Plastic pipe; qualifying persons to make joints.

(a) No person may make a plastic pipe joint unless that person has been qualified under the applicable joining procedure by--

- (1) Appropriate training or experience in the use of the procedure; and
- (2) Making a specimen joint from pipe sections joined according to the procedure that passes the inspection and test set forth in paragraph (b) or this section.

(b) The specimen joint must be--

- (1) Visually examined during and after assembly or joining and found to have the same appearance as a joint or photographs of a joint that is acceptable under the procedure; and
- (2) In the case of a heat fusion, solvent cement, or adhesive joint:

(i) Tested under §192.283;
(ii) Examined by ultrasonic inspection and found not to contain flaws that would cause failure; or

(iii) Cut into at least 3 longitudinal straps, each of which is--

(A) Visually examined and found not to contain voids or discontinuities on the cut surfaces of the joint area; and

(B) Deformed by bending, torque, or impact, and if failure occurs, it must not initiate in the joint area.

(c) A person must be requalified under an applicable procedure, if during any 12-month period that person--

(1) Does not make any joints under that procedure; or

(2) Has 3 joints or 3 percent of the joints made, whichever is greater, under that procedure that are found unacceptable by testing under §192.513.

(d) Each operator shall establish a method to determine that each person making joints in plastic pipelines in his system is qualified in accordance with this section.

192.287 Plastic pipe; inspection of joints.

No person may carry out the inspection of joints in plastic pipes required by 192.273(c) and 192.285(b) unless that person has been qualified by appropriate training or experience in evaluating the acceptability of plastic pipe joints made under the applicable joining procedure.

Subpart G—General Construction Requirements for Transmission Lines and Mains

192.301 Scope

This subpart prescribes minimum requirements for constructing transmission lines and mains.

192.303 Compliance with specifications or standards.

Each transmission line or main must be constructed in accordance with comprehensive written specifications or standards that are consistent with this part.

192.305 Inspection general.

Each transmission line or main must be inspected to ensure that it is constructed in accordance with this part.

192.307 Inspection of materials.

Each length of pipe and each other component must be visually inspected at the site of installation to ensure that it has not sustained any visually determinable damage that could impair its serviceability.

192.309 Repair of steel pipe.

(a) Each imperfection or damage that impairs the serviceability of a length of steel pipe must be repaired or removed. If a repair is made by grinding, the remaining wall thickness must at least be equal to either:

- (1) The minimum thickness required by the tolerances in the specification to which the pipe was manufactured; or
- (2) The nominal wall thickness required for the design pressure of the pipeline.

(b) Each of the following dents must be removed from steel pipe to be operated at a pressure that produces a hoop stress of 20 percent, or more, of SMYS:

- (1) A dent that contains a stress concentrator such as a scratch, gouge, groove, or arc burn.
- (2) A dent that affects the longitudinal weld or a circumferential weld.
- (3) In pipe to be operated at a pressure that produces a hoop stress of 40 percent or more of SMYS, a dent that has a depth of:

(i) More than one-quarter inch in pipe 12½ inches or less in outer diameter; or

(ii) More than 2 percent of the nominal pipe diameter in pipe over 12½ inches in outer diameter.

For the purpose of this section a "dent" is a depression that produces a gross disturbance in the curvature of the pipe wall without reducing the pipe-wall thickness. The depth of a dent is measured as the gap between the lowest point of the dent and a prolongation of the original contour of the pipe.

(c) Each arc burn on steel pipe to be operated at a pressure that produces a hoop stress of 40 percent, or more, of SMYS must be repaired or removed. If a repair is made by grinding, the arc burn must be completely removed and the remaining wall thickness must be at least equal to either:

- (1) The minimum wall thickness required by the tolerances in the specification to which the pipe was manufactured; or
- (2) The nominal wall thickness required for the design pressure of the pipeline.

(d) A gouge, groove, arc burn, or dent may not be repaired by insert patching or by pounding out.

(e) Each gouge, groove, arc burn, or dent that is removed from a length of pipe must be removed by cutting out the damaged portion as a cylinder.

192.311 Repair of plastic pipe.

Each imperfection or damage that would impair the serviceability of plastic pipe must be repaired by a patching saddle or removed.

192.313 Bends and elbows.

(a) Each field bend in steel pipe, other than a wrinkle bend made in accordance with 192.315, must comply with the following:

- (1) A bend must not impair the serviceability of the pipe.
- (2) For pipe more than 4 inches in nominal diameter, the difference between the maximum and minimum diameter at a bend must not be more than 2½ percent of the nominal diameter.
- (3) Each bend must have a smooth contour and be free from buckling, cracks, or any other mechanical damage.
- (4) On pipe containing a longitudinal weld, the longitudinal weld must be as near as practicable to the neutral axis of the bend unless—

(i) The bend is made with an internal bending mandrel, or

(ii) The pipe is 12 inches or less in outside diameter or has a diameter to wall thickness ratio less than 70.

(b) Each circumferential weld of steel pipe which is located where the stress during bending causes a permanent deformation in the pipe must be non-destructively tested either before or after the bending process.

(c) Wrought-steel welding elbows and transverse segments of these elbows may not be used for changes in direction on steel pipe that is 2 inches or more in diameter unless the arc length, as measured along the crotch, is at least 1 inch.

192.315 Wrinkle bends in steel pipe.

(a) A wrinkle bend may not be made on steel pipe to be operated at a pressure that produces a hoop stress of 30 percent, or more, of SMYS.

(b) Each wrinkle bend on steel pipe must comply with the following:

- (1) The bend must not have any sharp kinks.
- (2) When measured along the crotch of the bend, the wrinkles must be a distance of at least one pipe diameter.
- (3) On pipe 16 inches or larger in diameter, the bend may not have a deflection of more than $1\frac{1}{2}^{\circ}$ for each wrinkle.
- (4) On pipe containing a longitudinal weld the longitudinal seam must be as near as practicable to the neutral axis of the bend.

192.317 Protection from hazards.

(a) Each transmission line or main must be protected from washouts, floods, unstable soil, landslides, or other hazards that may cause the pipeline to move or to sustain abnormal loads. In addition, offshore pipelines must be protected from damage by mud slides, water currents, hurricanes, ship anchors, and fishing operations.

(b) Each aboveground transmission line or main, not located offshore or in inland navigable water areas, must be protected from accidental damage by vehicular traffic or other similar causes, either by being placed at a safe distance from the traffic or by installing barricades.

(c) Pipelines, including pipe risers, on each platform located offshore or in inland navigable waters must be protected from accidental damage by vessels.

192.319 Installation of pipe in a ditch.

(a) When installed in a ditch, each transmission line that is to be operated at a pressure producing a hoop stress of 20 percent or more of SMYS must be installed so that the pipe fits the ditch so as to minimize stresses and protect the pipe coating from damage.

(b) When a ditch for a transmission line or main is backfilled, it must be backfilled in a manner that--

- (1) Provides firm support under the pipe; and
- (2) Prevents damage to the pipe and pipe coating from equipment or from the backfill material.

(c) All offshore pipe in water at least 12 feet deep but not more than 200 feet deep, as measured from the mean low tide, must be installed so that the top of the pipe is below the natural bottom unless the pipe is supported by stanchions, held in place by anchors or heavy concrete coating, or protected by an equivalent means.

192.321 Installation of plastic pipe.

(a) Plastic pipe must be installed below ground level.

(b) Plastic pipe that is installed in a vault or any other below grade enclosure must be completely encased in gas-tight metal pipe and fittings that are adequately protected from corrosion.

(c) Plastic pipe must be installed so as to minimize shear or tensile stresses.

(d) Thermoplastic pipe that is not encased must have a minimum wall thickness of 0.090 inches, except that pipe with an outside diameter of 0.875 inches or less may have a minimum wall thickness of 0.062 inches.

(e) Plastic pipe that is not encased must have an electrically conductive wire or other means of locating the pipe while it is underground.

(f) Plastic pipe that is being encased must be inserted into the casing pipe in a manner that will protect the plastic. The leading end of the plastic must be closed before insertion.

192.323 Casing

Each casing used on a transmission line or main under a railroad or highway must comply with the following:

(a) The casing must be designed to withstand the superimposed loads.

(b) If there is a possibility of water entering the casing, the ends must be sealed.

(c) If the ends of an unvented casing are sealed and the sealing is strong enough to retain the maximum allowable operating pressure of the pipe, the casing must be designed to hold this pressure at a stress level of not more than 72 percent of SMYS.

(d) If vents are installed on a casing, the vents must be protected from the weather to prevent water from entering the casing.

192.325 Underground clearance.

(a) Each transmission line must be installed with at least 12 inches of clearance from any other underground structure not associated with the transmission line. If this clearance cannot be attained, the transmission line must be protected from damage that might result from the proximity of the other structure.

(b) Each main must be installed with enough clearance from any other underground structure to allow proper maintenance and to protect against damage that might result from proximity to other structures.

(c) In addition to meeting the requirements of paragraph (a) or (b) of this section, each plastic transmission line or main must be installed with sufficient clearance, or must be insulated, from any source of heat so as to prevent the heat from impairing the serviceability of the pipe.

(d) Each pipe-type or bottle-type holder must be installed with a minimum clearance from any other holder as prescribed in 192.175 (b).

192.327 Cover.

(a) Except as provided in paragraphs (c) and (e) of this section, each buried transmission line must be installed with a minimum cover as follows:

Location	Normal soil	Consolidated rock
	Inches	Inches
Class 1 locations	30	18
Class 2, 3, and 4 locations	36	24
Drainage ditches of public roads and railroad crossings	36	24

(b) Except as provided in paragraphs (c) and (d) of this section, each buried main must be installed with at least 24 inches of cover.

(c) Where an underground structure prevents the installation of a transmission line or main with the minimum cover, the transmission line or main may be installed with less cover if it is provided with additional protection to withstand anticipated external loads.

(d) A main may be installed with less than 24 inches of cover if the law of the State or municipality—

(1) Establishes a minimum cover of less than 24 inches.

(2) Requires that mains be installed in a common trench with other utility lines; and

(3) Provides adequately for prevention of damage to the pipe by external forces.

(e) All pipe which is installed in a navigable river, stream, or harbor must have a minimum cover of 48 inches in soil or 24 inches in consolidated rock, and all pipe installed in any offshore location under water less than 12 feet deep, as measured from mean low tide, must have a minimum cover of 36 inches in soil or 18 inches in consolidated rock, between the top of the pipe and the natural bottom. However, less than the minimum cover is permitted in accordance with paragraph (c) of this section.

**Subpart H—Customer Meters, Service
Regulators, and Service Lines**

192.351 Scope

This subpart prescribes minimum requirements for installing customer meters, service regulators, service lines, service line valves, and service line connections to mains.

**192.353 Customer meters and regulators;
location.**

(a) Each meter and service regulator, whether inside or outside of a building, must be installed in a readily accessible location and be protected from corrosion and other damage. However, the upstream regulator in a series may be buried.

(b) Each service regulator installed within a building must be located as near as practical to the point of service line entrance.

(c) Each meter installed within a building must be located in a ventilated place and not less than 3 feet from any source of ignition or any source of heat which might damage the meter.

(d) Where feasible, the upstream regulator in a series must be located outside the building, unless it is located in a separate metering or regulating building.

**192.355 Customer meters and regulators;
protection from damage.**

(a) **Protection from vacuum or back pressure.** If the customer's equipment might create either a vacuum or a back pressure, a device must be installed to protect the system.

(b) **Service regulator vents and relief vents.** The outside terminal of each service regulator vent and relief vent must:

- (1) Be rain and insect resistant;
- (2) Be located at a place where gas from the vent can escape freely into the atmosphere and away from any opening into the building; and
- (3) Be protected from damage caused by submergence in areas where flooding may occur.

(c) **Pits and vaults.** Each pit or vault that houses a customer meter or regulator at a place where vehicular traffic is anticipated, must be able to support that traffic.

**192.357 Customer meters and regulators;
installation.**

(a) Each meter and each regulator must be installed so as to minimize anticipated stresses upon the connecting piping and the meter.

(b) When close all-thread nipples are used, the wall thickness remaining after the threads are cut must meet the minimum wall thickness requirements of this part.

(c) Connections made of lead or other easily damaged material may not be used in the installation of meters or regulators.

(d) Each regulator that might release gas in its operation must be vented to the outside atmosphere.

**192.359 Customer meter installations;
operating pressure.**

(a) A meter may not be used at a pressure that is more than 67 percent of the manufacturer's shell test pressure.

(b) Each newly installed meter manufactured after November 12, 1970, must have been tested to a minimum of 10 p.s.i.g.

(c) A rebuilt or repaired tinned steel case meter may not be used at a pressure that is more than 50 percent of the pressure used to test the meter after rebuilding or repairing.

192.361 Service lines; installation.

(a) **Depth.** Each buried service line must be installed with at least 12 inches of cover in private property and at least 18 inches of cover in streets and roads. However, where an underground structure prevents installation at those depths, the service line must be able to withstand any anticipated external load.

(b) **Support and backfill.** Each service line must be properly supported on undisturbed or well-compacted soil, and material used for backfill must be free of materials that could damage the pipe or its coating.

(c) **Grading for drainage.** Where condensate in the gas might cause interruption in the gas supply to the customer, the service line must be graded so as to drain into the main or into drips at the low points in the service line.

(d) **Protection against piping strain and external loading.** Each service line must be installed so as to minimize anticipated piping strain and external loading.

(e) **Installation of service lines into buildings.** Each underground service line installed below

grade through the outer foundation wall of a building must:

- (1) In the case of a metal service line, be protected against corrosion;
- (2) In the case of plastic service line, be protected from shearing action and backfill settlement; and
- (3) Be sealed at the foundation wall to prevent leakage into the building.

(f) **Installation of service lines under buildings.** Where an underground service line is installed under a building;

- (1) It must be encased in a gas-tight conduit;
- (2) The conduit and the service line must, if the service line supplies the building it underlies, extend into a normally usable and accessible part of the building; and
- (3) The space between the conduit and the service line must be sealed to prevent gas leakage into the building and, if the conduit is sealed at both ends, a vent line from the annular space must extend to a point where gas would not be a hazard, and extend above grade, terminating in a rain and insect resistant fitting.

192.363 Service lines; valve requirements.

(a) Each service line must have a service-line valve that meets the applicable requirements of Subparts B and D of this part. A valve incorporated in a meter bar, that allows the meter to be bypassed, may not be used as a service-line valve.

(b) A soft seat service line valve may not be used if its ability to control the flow of gas could be adversely affected by exposure to anticipated heat.

(c) Each service-line valve on a high-pressure service line, installed above ground or in an area where the blowing of gas would be hazardous, must be designed and constructed to minimize the possibility of the removal of the core of the valve with other than specialized tools.

192.365 Service lines; location of valves.

(a) **Relation to regulator or meter.** Each service-line valve must be installed upstream of the regulator or, if there is no regulator, upstream of the meter.

(b) **Outside valves.** Each service line must have a shut-off valve in a readily accessible location that, if feasible, is outside of the building.

(c) **Underground valves.** Each underground service-line valve must be located in a covered durable curb box or standpipe that allows ready operation of the valve and is supported independently of the service lines.

192.367 Service lines; general requirements for connections to mains.

(a) **Location.** Each service-line connection to a main must be located at the top of the main or, if that is not practical, at the side of the main, unless a suitable protective device is installed to minimize the possibility of dust and moisture being carried from the main into the service line.

(b) **Compression-type connection to mains.** Each compression-type service line to main connection must:

- (1) Be designed and installed to effectively sustain the longitudinal pull-out or thrust forces caused by contraction or expansion of the piping, or by anticipated external or internal loading; and
- (2) If gaskets are used in connecting the service line to the main connection fitting, have gaskets that are compatible with the kind of gas in the system.

192.369 Service lines; connection to cast iron or ductile iron mains.

(a) Each service line connected to a cast iron or ductile iron main must be connected by a mechanical clamp, by drilling and tapping the main, or by another method meeting the requirements of 192.273.

(b) If a threaded tap is being inserted, the requirements of 192.151 (b) and (c) must also be met.

192.371 Service lines; steel.

Each steel service line to be operated at less than 100 p.s.i.g. must be constructed of pipe designed for a minimum of 100 p.s.i.g.

192.373 Service lines; cast iron and ductile iron.

(a) Cast or ductile iron pipe less than 6 inches in diameter may not be installed for service lines.

(b) If cast iron pipe or ductile iron pipe is installed for use as a service line, the part of the service line which extends through the building wall must be of steel pipe.

(c) A cast iron or ductile iron service line may not be installed in unstable soil or under a building.

192.375 Service Line: Plastic.

(a) Each plastic service line outside a building must be installed below ground level, except that it may terminate above the ground and outside the building, if—

- (1) The above ground part of the plastic service line is protected against deterioration and external damage; and

(2) The plastic service line is not used to support external loads.

(b) Each plastic service line inside a building must be protected against external damage.

192.377 Service lines; copper.

Each copper service line installed within a building must be protected against external damage.

192.379 New service lines not in use.

Each service line that is not placed in service upon completion of installation must comply with one of the following until the customer is supplied with gas:

(a) The valve that is closed to prevent the flow of gas to the customer must be provided with a locking device or other means designed to prevent the opening of the valve by persons other than those authorized by the operator.

(b) A mechanical device or fitting that will prevent the flow of gas must be installed in the service line or in the meter assembly.

(c) The customer's piping must be physically disconnected from the gas supply and the open pipe ends sealed.

Subpart I—Requirements for Corrosion Control

192.451 Scope

This subpart prescribes minimum requirements for the protection of metallic pipelines from external, internal, and atmospheric corrosion.

192.452 Applicability to converted pipelines.

Notwithstanding the date the pipeline was installed or any earlier deadlines for compliance, each pipeline which qualifies for use under this part in accordance with paragraph 192.14 must meet the requirements of this subpart specifically applicable to pipelines installed before August 1, 1971, and all other applicable requirements within 1 year after the pipeline is readied for service. However, the requirements of this subpart specifically applicable to pipelines installed after July 31, 1971, apply if the pipeline substantially meets those requirements before it is readied for service or it is a segment which is replaced, relocated, or substantially altered.

192.453 General

Each operator shall establish procedures to implement the requirements of this subpart. These procedures, including those for the design, installation, operation and maintenance of cathodic protection systems, must be carried out by, or under the direction of, a person qualified by experience and training in pipeline corrosion control methods.

192.455 External corrosion control:buried or submerged pipelines installed after July 31, 1971.

(a) Except as provided in paragraphs (b), (c), and (f) of this section, each buried or submerged pipeline installed after July 31, 1971, must be protected against external corrosion, including the following:

(1) It must have an external protective coating meeting the requirements of 192.461.

(2) It must have a cathodic protection system designed to protect the pipeline in its entirety in accordance with this subpart, installed and placed in operation within one year after completion of construction.

(b) An operator need not comply with paragraph (a) of this section, if the operator can demonstrate by tests, investigation, or experience in the area of application, including, as a minimum, soil resistivity measurements and tests

for corrosion accelerating bacteria, that a corrosive environment does not exist. Tests, investigation, or experience must be backed by documented proof to substantiate results and determinations. However, within 6 months after an installation made pursuant to the preceding sentence, the operator shall conduct tests, including pipe-to-soil potential measurements with respect to either a continuous reference electrode or an electrode using close spacing, not to exceed 20 feet, and soil resistivity measurements at potential profile peak locations, to adequately evaluate the potential profile along the entire pipeline. If the tests made indicate that a corrosive condition exists, the pipeline must be cathodically protected in accordance with paragraph (a) (2) of this section.

(c) An operator need not comply with paragraph (a) of this section, if the operator can demonstrate by tests, investigation, or experience that:

(1) For a copper pipeline, a corrosive environment does not exist; or

(2) For a temporary pipeline with an operating period of service not to exceed 5 years beyond installation, corrosion during the 5-year period of service of the pipeline will not be detrimental to public safety.

(d) Notwithstanding the provisions of paragraph (b) or (c) of this section, if a pipeline is externally coated, it must be cathodically protected in accordance with paragraph (a) (2) of this section.

(e) Aluminum may not be installed in a buried or submerged pipeline if that aluminum is exposed to an environment with a natural pH in excess of 8, unless tests or experience indicate its suitability in the particular environment involved.

(f) This section does not apply to electrically isolated, metal alloy fittings in plastic pipelines if—

(1) For the size fitting to be used, an operator can show by tests, investigation, or experience in the area of application, that adequate corrosion control is provided by alloyage;

(2) The fitting is designed to prevent leakage caused by localized corrosion pitting; and

(3) A means is provided for identifying the location of the fitting.

192.457 External corrosion control; buried or submerged pipelines installed before August 1, 1971.

(a) Except for buried piping at compressor, reg-

ulator, and measuring stations, each buried or submerged transmission line installed before August 1, 1971, that has an effective external coating must be cathodically protected along the entire area that is effectively coated, in accordance with this subpart. For the purposes of this subpart, a pipeline does not have an effective external coating if its cathodic protection current requirements are substantially the same as if it were bare. The operator shall make tests to determine the cathodic protection current requirements.

(b) Except for cast iron or ductile iron, each of the following buried or submerged pipelines installed before August 1, 1971, must be cathodically protected in accordance with this subpart in areas in which active corrosion is found;

(1) Bare or ineffectively coated transmission lines.
(2) Bare or coated pipes at compressor, regulator, and measuring stations.

(3) Bare or coated distribution lines. The operator shall determine the areas of active corrosion by electrical survey, or where electrical survey is impractical, by the study of corrosion and leak history records, by leak detection survey, or by other effective means, documented by data substantiating results and determinations.

(c) For the purpose of this subpart, active corrosion means continuing corrosion which, unless controlled, could result in a condition that is detrimental to public safety.

(d) When a condition of active external corrosion is found, positive action must be taken to mitigate and control the effects of the corrosion. Schedules must be established for application of corrosion control. Monitoring effectiveness must be adequate to mitigate and control the effects of the corrosion prior to its becoming a public hazard or endangering public safety.

192.459 External corrosion control; examination of buried pipeline when exposed.

Whenever an operator has knowledge that any portion of a buried pipeline is exposed, the exposed portion must be examined for evidence of external corrosion if the pipe is bare, or if the coating is deteriorated. If external corrosion is found, remedial action must be taken to the extent required by 192.483 and the applicable paragraphs of 192.485, 192.487, or 192.489.

192.461 External corrosion control; protective coating.

(a) Each external protective coating, whether conductive or insulating, applied for the purpose of external corrosion control must:

- (1) Be applied on a properly prepared surface;
- (2) Have sufficient adhesion to the metal surface to effectively resist underfilm migration of moisture;
- (3) Be sufficiently ductile to resist cracking;
- (4) Have sufficient strength to resist damage due to handling and soil stress; and
- (5) Have properties compatible with any supplemental cathodic protection.

(b) Each external protective coating which is an electrically insulating type must also have low moisture absorption and high electrical resistance.

(c) Each external protective coating must be inspected just prior to lowering the pipe into the ditch and backfilling, and any damage detrimental to effective corrosion control must be repaired.

(d) Each external protective coating must be protected from damage resulting from adverse ditch conditions or damage from supporting blocks.

(e) If coated pipe is installed by boring, driving, or other similar method, precautions must be taken to minimize damage to the coating during installation.

192.463 External corrosion control; cathodic protection.

(a) Each cathodic protection system required by this subpart must provide a level of cathodic protection that complies with one or more of the applicable criteria contained in Appendix D of this subpart. If none of these criteria is applicable, the cathodic protection system must provide a level of cathodic protection at least equal to that provided by compliance with one or more of these criteria.

(b) If amphoteric metals are included in a buried or submerged pipeline containing a metal of different anodic potential:

- (1) The amphoteric metals must be electrically isolated from the remainder of the pipeline and cathodically protected; or
- (2) The entire buried or submerged pipeline must be cathodically protected at a cathodic potential that meets the requirements of Appendix D of this part for amphoteric metals.

(c) The amount of cathodic protection must be controlled so as not to damage the protective coating or the pipe.

192.465 External corrosion control; monitoring.

(a) Each pipeline that is under

cathodic protection must be tested at least once each calendar year, but with intervals not exceeding 15 months, to determine whether the cathodic protection meets the requirements of 192.463. Test points (electrode locations) used when taking pipe-to-soil readings for determining cathodic protection shall be selected so as to give representative pipe-to-soil readings. Test points (electrode locations) over or near an anode or anodes shall not, by themselves, be considered representative readings. However, if tests at those intervals are impractical for separately protected sections of pipeline not in excess of 100 feet, these pipeline sections may be surveyed on a sampling basis. At least 10 percent of these separately protected sections, distributed over the entire system, must be surveyed each calendar year with a different 10 percent checked each subsequent year, so that all separately protected pipeline sections are tested in each 10-year period.

(b) Each cathodic protection rectifier or other impressed current power source must be inspected six times each calendar year, but with intervals not exceeding 2½ months, to insure that it is operating.

(c) Each reverse current switch, each diode, and each interference bond whose failure would jeopardize structure protection must be electrically checked for proper performance six times each calendar year, but with intervals not exceeding 2½ months. Each other interference bond must be checked at least once each calendar year, but with intervals not exceeding 15 months.

(d) Each operator shall take prompt remedial action to correct any deficiencies indicated by the monitoring.

(e) After the initial evaluation required by paragraphs (b) and (c) of 192.455 and paragraph (b) of 192.457, each operator shall, at intervals not exceeding 3 years, reevaluate its unprotected pipelines and cathodically protect them in accordance with this subpart in areas in which active corrosion is found. The operator shall determine the areas of active corrosion by electrical survey, or where electrical survey is impractical, by the study of

corrosion and leak history records, by leak detection survey, or by other effective means, documented by data substantiating results and determinations.

(f) When leak detection surveys are used to determine areas of active corrosion, the survey frequency must be increased to monitor the corrosion rate and control the condition. The detection equipment used must have sensitivity adequate to detect gas concentration below the lower explosive limit and be suitable for such use.

192.467 External corrosion control; electrical isolation.

(a) Each buried or submerged pipeline must be electrically isolated from other underground metallic structures, unless the pipeline and the other structures are electrically interconnected and cathodically protected as a single unit.

(b) One or more insulating devices must be installed where electrical isolation of a portion of a pipeline is necessary to facilitate the application of corrosion control.

(c) Except for unprotected copper inserted in ferrous pipe, each pipeline must be electrically isolated from metallic casings that are a part of the underground system. However, if isolation is not achieved because it is impractical, other measures must be taken to minimize corrosion of the pipeline inside the casing.

(d) Inspection and electrical tests must be made to assure that electrical isolation is adequate.

(e) An insulating device may not be installed in an area where a combustible atmosphere is anticipated unless precautions are taken to prevent arcing.

(f) Where a pipeline is located in close proximity to electrical transmission tower footings, ground cables or counterpoise, or in other areas where fault currents or unusual risk of lightning may be anticipated, it must be provided with protection against damage due to fault currents or lightning, and protective measures must also be taken at insulating devices.

192.469 External corrosion control; test stations.

Each pipeline under cathodic protection required by this subpart must have sufficient test stations or other contact points for electrical measurement to determine the adequacy of cathodic protection.

192.471 External corrosion control; test leads.

(a) Each test lead wire must be connected to the pipeline so as to remain mechanically secure and electrically conductive.

(b) Each test lead wire must be attached to the pipeline so as to minimize stress concentration on the pipe.

(c) Each bared test lead wire and bared metallic area at point of connection to the pipeline must be coated with an electrical insulating material compatible with the pipe coating and the insulation on the wire.

192.473 External corrosion control; interference currents.

(a) Each operator whose pipeline system is subjected to stray currents shall have in effect a continuing program to minimize the detrimental effects of such currents.

(b) Each impressed current type cathodic protection system or galvanic anode system must be designed and installed so as to minimize any adverse effects on existing adjacent underground metallic structures.

192.475 Internal corrosion control; general.

(a) Corrosive gas may not be transported by pipeline, unless the corrosive effect of the gas on the pipeline has been investigated and steps have been taken to minimize internal corrosion. "Corrosive gas" means a gas which, by chemical reaction with the pipe to which it is exposed, usually metal, produces a deterioration of the material.

(b) Whenever any pipe is removed from a pipeline for any reason, the internal surface must be inspected for evidence of corrosion. If internal corrosion is found:

(1) The adjacent pipe must be investigated to determine the extent of internal corrosion;

(2) Replacement must be made to the extent required by the applicable paragraphs of 192.485, 192.487, or 192.489; and

(3) Steps must be taken to minimize the internal corrosion.

(c) Gas containing more than 0.1 grain of hydrogen sulfide per 100 standard cubic feet may not be stored in pipe-type or bottle-type holders.

192.477 Internal corrosion control; monitoring.

If corrosive gas is being transported, coupons or other suitable means must be used to determine the effectiveness of the steps taken to minimize internal corrosion. Each coupon or other means of

monitoring internal corrosion must be checked two times each calendar year, but with intervals not exceeding 7½ months.

192.479 Atmospheric corrosion control; general.

(a) Pipelines installed after July 31, 1971. Each above ground pipeline or portion of a pipeline installed after July 31, 1971 that is exposed to the atmosphere must be cleaned and either coated or jacketed with a material suitable for the prevention of atmospheric corrosion. An operator need not comply with this paragraph, if the operator can demonstrate by test, investigation, or experience in the area of application, that a corrosive atmosphere does not exist.

(b) Pipelines installed before August 1, 1971. Each operator having an above-ground pipeline or portion of a pipeline installed before August 1, 1971 that is exposed to the atmosphere, shall:

(1) Determine the areas of atmospheric corrosion on the pipeline;

(2) If atmospheric corrosion is found, take remedial measure to the extent required by the applicable paragraphs of 192.485, 192.487, or 192.489; and

(3) Clean and either coat or jacket the areas of atmospheric corrosion on the pipeline with a material suitable for the prevention of atmospheric corrosion.

(c) "Atmospheric corrosion" means aboveground corrosion caused by chemical or electro-chemical reaction between a pipe material, usually a metal, and its environment, that produces a deterioration of the material.

192.481 Atmospheric corrosion control: monitoring.

After meeting the requirements of §192.479 (a) and (b), each operator shall, at intervals not exceeding 3 years for onshore pipelines and at least once each calendar year, but with intervals not exceeding 15 months, for offshore pipelines, reevaluate each pipeline that is exposed to the atmosphere and take remedial action whenever necessary to maintain protection against atmospheric corrosion.

192.483 Remedial measures; general.

(a) Each segment of metallic pipe that replaces pipe removed from a buried or submerged pipeline

because of external corrosion must have a properly prepared surface and must be provided with an external protective coating that meets the requirements of 192.461.

(b) Each segment of metallic pipe that replaces pipe removed from a buried or submerged pipeline because of external corrosion must be cathodically protected in accordance with this subpart.

(c) Except for cast iron or ductile iron pipe, each segment of buried or submerged pipe that is required to be repaired because of external corrosion must be cathodically protected in accordance with this subpart.

192.485 Remedial measures; transmission lines.

(a) **General corrosion.** Each segment of transmission line with general corrosion and with a remaining wall thickness less than that required for the maximum allowable operating pressure of the pipeline must be replaced or the operating pressure reduced commensurate with the strength of the pipe based on the actual remaining wall thickness. However, if the area of general corrosion is small, the corroded pipe may be repaired. Corrosion pitting so closely grouped as to affect the overall strength of the pipe is considered general corrosion for the purpose of this paragraph.

(b) **Localized corrosion pitting.** Each segment of transmission line pipe with localized corrosion pitting to a degree where leakage might result must be replaced or repaired, or the operating pressure must be reduced commensurate with the strength of the pipe, based on the actual remaining wall thickness in the pits.

192.487 Remedial measures; distribution lines other than cast iron or ductile iron lines.

(a) **General corrosion.** Except for cast iron or ductile iron pipe, each segment of generally corroded distribution line pipe with a remaining wall thickness less than that required for the maximum allowable operating pressure of the pipeline, or a remaining wall thickness less than 30 percent of the nominal wall thickness, must be replaced. However, if the area of general corrosion is small, the corroded pipe may be repaired. Corrosion pitting so closely grouped as to affect the overall strength of the pipe is considered general corrosion for the purpose of this paragraph.

(b) **Localized corrosion pitting.** Except for cast iron or ductile iron pipe, each segment of distribution line pipe with localized corrosion pitting to a degree where leakage might result must be replaced or repaired.

192.489 Remedial measures; cast iron and ductile iron pipelines.

(a) **General graphitization.** Each segment of cast iron or ductile iron pipe on which general graphitization is found to a degree where a fracture or any leakage might result, must be replaced.

(b) **Localized graphitization.** Each segment of cast iron or ductile iron pipe on which localized graphitization is found to a degree where any leakage might result, must be replaced or repaired, or sealed by internal sealing methods adequate to prevent or arrest any leakage.

192.491 Corrosion control records.

(a) Each operator shall maintain records or maps to show the location of cathodically protected piping, cathodic protection facilities, other than unrecorded galvanic anodes installed before August 1, 1971, and neighboring structures bonded to the cathodic protection system.

(b) Each of the following records must be retained for as long as the pipeline remains in service:

(1) Each record or map required by paragraph (a) of this section.

(2) Records of each test, survey, or inspection required by this subpart, in sufficient detail to demonstrate the adequacy of corrosion control measures or that a corrosive condition does not exist.

Subpart J—Test Requirements

192.501 Scope

This subpart prescribes minimum leak-test and strength-test requirements for pipelines.

192.503 General requirements

(a) No person may operate a new segment of pipeline, or return to service a segment of pipeline that has been relocated or replaced, until:

- (1) It has been tested in accordance with this subpart to substantiate the proposed maximum allowable operating pressure; and
- (2) Each potentially hazardous leak has been located and eliminated.

(b) The test medium must be liquid, air, natural gas, or inert gas that is:

- (1) Compatible with the material of which the pipeline is constructed;
- (2) Relatively free of sedimentary materials; and
- (3) Except for natural gas, nonflammable.

(c) Except as provided in §192.505 (a), if air, natural gas, or inert gas is used as the test medium, the following maximum hoop stress limitations apply:

Class location	Maximum hoop stress allowed as percentage of SMYS	
	Natural gas	Air or inert gas
1	80	80
2	30	75
3	30	50
4	30	40

(d) Each weld used to tie-in a test segment of pipeline is excepted from the test requirements of this subpart.

192.505 Strength test requirements for steel pipeline to operate at a hoop stress of 30 percent or more of SMYS.

(a) Except for service lines, each segment of a steel pipeline that is to operate at a hoop stress of 30 percent or more of SMYS must be strength tested in accordance with this section to substantiate the proposed maximum allowable operating pressure. In addition, in a Class 1 or Class 2 location, if there is a building intended for human occupancy within 300 feet of a pipeline, a hydrostatic test must be conducted to a test pressure of at least 125 percent of maximum operating pressure on that segment of the pipeline within 300 feet of such a building, but in no event may the test section be less than 600 feet unless the length of the newly installed or relocated pipe is less than 600 feet. However, if the buildings are evacuated

while the hoop stress exceeds 50 percent of SMYS, air or inert gas may be used as the test medium.

(b) In a Class 1 or Class 2 location, each compressor station, regulator station, and measuring station, must be tested to at least Class 3 location test requirements.

(c) Except as provided in paragraph (e) of this section, the strength test must be conducted by maintaining the pressure at or above the test pressure for at least 8 hours.

(d) If a component other than pipe is the only item being replaced or added to a pipeline, a strength test after installation is not required, if the manufacturer of the component certifies that:

(1) The component was tested to at least the pressure required for the pipeline to which it is being added; or

(2) The component was manufactured under a quality control system that ensures that each item manufactured is at least equal in strength to a prototype and that the prototype was tested to at least the pressure required for the pipeline to which it is being added.

(e) For fabricated units and short sections of pipe, for which a post installation test is impractical, a preinstallation strength test must be conducted by maintaining the pressure at or above the test pressure for at least 4 hours.

192.507 Test requirements for pipelines to operate at a hoop stress less than 30 percent of SMYS and above 100 p.s.i.g.

Except for service lines and plastic pipelines, each segment of a pipeline that is to be operated at a hoop stress less than 30 percent of SMYS and above 100 p.s.i.g. must be tested in accordance with the following:

(a) The pipeline operator must use a test procedure that will ensure discovery of all potentially hazardous leaks in the segment being tested.

(b) If, during the test, the segment is to be stressed to 20 percent or more of SMYS and natural gas, inert gas, or air is the test medium:

- (1) A leak test must be made at a pressure between 100 p.s.i.g. and the pressure required to produce a hoop stress of 20 percent of SMYS; or
- (2) The line must be walked to check for leaks while the hoop stress is held at approximately 20 percent of SMYS.

(c) The pressure must be maintained at or above the test pressure for at least 1 hour.

192.509 Test requirements for pipeline to operate at or below 100 p.s.i.g.

Except for service lines and plastic pipelines, each segment of a pipeline that is to be operated

at or below 100 p.s.i.g. must be leak tested in accordance with the following:

(a) The test procedure used must ensure discovery of all potentially hazardous leaks in the segment being tested.

(b) Each main that is to be operated at less than 1 p.s.i.g. must be tested to at least 10 p.s.i.g. and each main to be operated at or above 1 p.s.i.g. must be tested to at least 90 p.s.i.g.

192.511 Test requirements for service lines.

(a) Each segment of a service line (other than plastic) must be leak tested in accordance with this section before being placed in service. If feasible, the service-line connection to the main must be included in the test; if not feasible, it must be given a leakage test at the operating pressure when placed in service.

(b) Each segment of a service line (other than plastic) intended to be operated at a pressure of at least 1 p.s.i.g. but not more than 40 p.s.i.g. must be given a leak test at a pressure of not less than 50 p.s.i.g.

(c) Each segment of a service line (other than plastic) intended to be operated at pressures of more than 40 p.s.i.g. must be tested to at least 90 p.s.i.g., except that each segment of a steel service line stressed to 20 percent or more of SMYS must be tested in accordance with §192.507 of this subpart.

192.513 Test requirements for plastic pipelines.

(a) Each segment of a plastic pipeline must be tested in accordance with this section.

(b) The test procedure must insure discovery of all potentially hazardous leaks in the segment being tested.

(c) The test pressure must be at least 150 percent of the maximum operating pressure or 50 p.s.i.g, whichever is greater. However, the maximum test pressure may not be more than three times the design pressure of the pipe.

(d) The temperature of thermoplastic material must not be more than 100° F. during the test.

192.515 Environmental protection and safety requirements.

(a) In conducting tests under this subpart, each operator shall ensure that every reasonable precaution is taken to protect its employees and the general public during the testing. Whenever the hoop stress of the segment of the pipeline being tested will exceed 50 percent of SMYS, the oper-

ator shall take all practicable steps to keep persons not working on the testing operation outside of the testing area until the pressure is reduced to or below the proposed maximum allowable operating pressure.

(b) The operator shall insure that the test medium is disposed of in a manner that will minimize damage to the environment.

192.517 Records

Each operator shall make and retain for the useful life of the pipeline, a record of each test performed under paragraphs 192.505 and 192.507. The record must contain at least the following information:

(a) The operator's name, the name of the operator's employee responsible for making the test, and the name of any test company used.

(b) Test medium used.

(c) Test pressure.

(d) Test duration.

(e) Pressure recording charts, or other record of pressure readings.

(f) Elevation variations, whenever significant for the particular test.

(g) Leaks and failures noted and their disposition.

Subpart K—Uprating

192.551 Scope

This subpart prescribes minimum requirements for increasing maximum allowable operating pressures (uprating) for pipelines.

192.553 General

(a) **Pressure increases.** Whenever the requirements of this subpart require that an increase in operating pressure be made in increments, the pressure must be increased gradually, at a rate that can be controlled, and in accordance with the following:

(1) At the end of each incremental increase, the pressure must be held constant while the entire segment of pipeline that is affected is checked for leaks.

(2) Each leak detected must be repaired before a further pressure increase is made, except that a leak determined not to be potentially hazardous need not be repaired, if it is monitored during the pressure increase and it does not become potentially hazardous.

(b) **Records.** Each operator who uprates a segment of pipeline shall retain for the life of the segment a record of each investigation required by this subpart, of all work performed, and of each pressure test conducted, in connection with the uprating.

(c) **Written plan.** Each operator who uprates a segment of pipeline shall establish a written procedure that will ensure that each applicable requirement of this subpart is complied with.

(d) **Limitation on increase in maximum allowable operating pressure.** Except as provided in 192.555 (c), a new maximum allowable operating pressure established under this subpart may not exceed the maximum that would be allowed under this part for a new segment of pipeline constructed of the same materials in the same location.

192.555 Uprating; to a pressure that will produce a hoop stress of 30 percent or more of SMYS in steel pipelines.

(a) Unless the requirements of this section have been met, no person may subject any segment of a steel pipeline to an operating pressure that will produce a hoop stress of 30 percent or more of SMYS and that is above the established maximum allow-

able operating pressure.

(b) Before increasing operating pressure above the previously established maximum allowable operating pressure the operator shall:

(1) Review the design, operating and maintenance history and previous testing of the segment of pipeline and determine whether the proposed increase is safe and consistent with the requirements of this part; and

(2) Make any repairs, replacements, or alterations in the segment of pipeline that are necessary for safe operation at the increased pressure.

(c) After complying with paragraph (b) of this section, an operator may increase the maximum allowable operating pressure of a segment of pipeline constructed before September 12, 1970, to the highest pressure that is permitted under 192.619, using as test pressure the highest pressure to which the segment of pipeline was previously subjected (either in a strength test or in actual operation).

(d) After complying with paragraph (b) of this section, an operator that does not qualify under paragraph (c) of this section may increase the previously established maximum allowable operating pressure if at least one of the following requirements is met:

(1) The segment of pipeline is successfully tested in accordance with the requirements of this part for a new line of the same material in the same location.

(2) An increased maximum allowable operating pressure may be established for a segment of pipeline in a Class 1 location if the line has not previously been tested, and if:

(i) It is impractical to test it in accordance with the requirements of this part;

(ii) The new maximum operating pressure does not exceed 80 percent of that allowed for a new line of the same design in the same location; and

(iii) The operator determines that the new maximum allowable operating pressure is consistent with the condition of the segment of pipeline and the design requirements of this part.

(e) Where a segment of pipeline is uprated in accordance with paragraph (c) or (d) (2) of this section, the increase in pressure must be made in increments that are equal to:

(1) 10 percent of the pressure before the uprating; or

(2) 25 percent of the total pressure increase, whichever produces the fewer number of increments.

192.557 Uprating; steel pipelines to a pressure that will produce a hoop stress less than 30 percent of SMYS; plastic, cast iron, and ductile iron pipelines.

(a) Unless the requirements of this section have been met, no person may subject:

(1) A segment of steel pipeline to an operating pressure that will produce a hoop stress less than 30 percent of SMYS and that is above the previously established maximum allowable operating pressure; or

(2) A plastic, cast iron, or ductile iron pipeline segment to an operating pressure that is above the previously established maximum allowable operating pressure.

(b) Before increasing operating pressure above the previously established maximum allowable operating pressure, the operator shall:

(1) Review the design, operating, and maintenance history of the segment of pipeline;

(2) Make a leakage survey (if it has been more than 1 year since the last survey) and repair any leaks that are found, except that a leak determined not to be potentially hazardous need not be repaired if it is monitored during the pressure increase and it does not become potentially hazardous;

(3) Make any repairs, replacements or alterations in the segment of pipeline that are necessary for safe operation at the increased pressure;

(4) Reinforce or anchor offsets, bends and dead ends in pipe joined by compression couplings or bell and spigot joints to prevent failure of the pipe joint, if the offset, bend or dead end is exposed in an excavation;

(5) Isolate the segment of pipeline in which the pressure is to be increased from any adjacent segment that will continue to be operated at a lower pressure; and

(6) If the pressure in mains or service lines, or both, is to be higher than the pressure delivered to the customer, install a service regulator on each service line and test each regulator to determine that it is functioning. Pressure may be increased as necessary to test each regulator, after a regulator has been installed on each pipeline subject to the increased pressure.

(c) After complying with paragraph (b) of this section, the increase in maximum allowable operating pressure must be made in increments that are equal to 10 p.s.i.g. or 25 percent of the total pressure increase, whichever produces the fewer number of increments. Whenever the requirements of paragraph (b) (6) of this section apply, there must be at least two approximately equal incremental increases.

(d) If records for cast iron or ductile iron pipeline facilities are not complete enough to ascertain compliance with 192.117 or 192.119, as applicable, the following procedures must be followed:

(1) If the original laying conditions cannot be ascertained, the operator shall assume, when applying the design formulas of ANSI A21.1, that cast iron pipe was supported on blocks with tamped backfill and, when applying the design formulas of ANSI A21.50, that ductile iron pipe was laid without blocks with tamped backfill.

(2) Unless the actual maximum cover depth is known, the operator shall measure the actual cover in at least three places where the cover is most likely to be greatest and shall use the greatest cover measured.

(3) Unless the actual nominal wall thickness is known, the operator shall determine the wall thickness by cutting and measuring coupons from at least three separate pipe lengths. The coupons must be cut from pipe lengths in areas where the cover depth is most likely to be the greatest. The average of all measurements taken must be increased by the allowance indicated in the following table:

Pipe size (inches)	Allowance (inches)		
	Pit cast pipe	Centrif- ugally cast pipe	Ductile iron pipe
3-8	0.075	0.065	0.065
10-12	0.08	0.07	0.07
14-24	0.08	0.08	0.075
30-42	0.09	0.09	0.075
48	0.09	0.09	0.08
54-60	0.09

NOTE—The nominal wall thickness of the cast iron is the standard thickness listed in table 10 or table 11, as applicable, of ANSI A21.1 nearest the value obtained under this subparagraph. The nominal wall thickness of ductile iron pipe is the standard thickness listed in table 6 of ANSI A21.50 nearest the value obtained under this subparagraph.

(4) For cast iron pipe, unless the pipe manufacturing process is known, the operator shall assume that the pipe is pit cast pipe with a bursting tensile strength of 11,000 p.s.i. and a modulus of rupture of 31,000 p.s.i.

Subpart L—Operations

192.601 Scope

This subpart prescribes minimum requirements for the operation of pipeline facilities.

192.603 General provisions

(a) No person may operate a segment of pipeline unless it is operated in accordance with this subpart.

(b) Each operator shall establish a written operating and maintenance plan meeting the requirements of this part and keep records necessary to administer the plan.

§192.605 Essentials of operating and maintenance plan.

Each operator shall include the following in its operating and maintenance plan:

(a) Instructions for employees covering operating and maintenance procedures during normal operations and repairs.

(b) Items required to be included by the provisions of Subpart M of this part.

(c) Specific programs relating to facilities presenting the greatest hazard to public safety either in an emergency or because of extraordinary construction or maintenance requirements.

(d) A program for conversion procedures, if conversion of a low-pressure distribution system to a higher pressure is contemplated.

(e) Provision for periodic inspections to ensure that operating pressures are appropriate for the class location.

192.607 Initial determination of class location and confirmation or establishment of maximum allowable operating pressure.

(a) Before April 15, 1971, each operator shall complete a study to determine for each segment of pipeline with a maximum allowable operating pressure that will produce a hoop stress that is more than 40 percent of SMYS:

(1) The present class location of all such pipeline in its system; and

(2) Whether the hoop stress corresponding to the maximum allowable operating pressure for each

segment of pipeline is commensurate with the present class location.

(b) Each segment of pipeline that has been determined under paragraph (a) of this section to have an established maximum allowable operating pressure producing a hoop stress that is not commensurate with the class location of the segment of pipeline and that is found to be in satisfactory condition, must have the maximum allowable operating pressure confirmed or revised in accordance with 192.611. The confirmation or revision must be completed not later than December 31, 1974.

(c) Each operator required to confirm or revise an established maximum allowable operating pressure under paragraph (b) of this section shall, not later than December 31, 1971, prepare a comprehensive plan, including a schedule, for carrying out the confirmations or revisions. The comprehensive plan must also provide for confirmation or revisions determined to be necessary under 192.609, to the extent that they are caused by changes in class locations taking place before July 1, 1973.

192.609 Change in class location; required study.

Whenever an increase in population density indicates a change in class location for a segment of an existing steel pipeline operating at hoop stress that is more than 40 percent of SMYS, or indicates that the hoop stress corresponding to the established maximum allowable operating pressure for a segment of existing pipeline is not commensurate with the present class location, the operator shall immediately make a study to determine:

(a) The present class location for the segment involved.

(b) The design, construction, and testing procedures followed in the original construction, and a comparison of these procedures with those required for the present class location by the applicable provisions of this part.

(c) The physical condition of the segment to the extent it can be ascertained from available records;

(d) The operating and maintenance history of the segment;

(e) The maximum actual operating pressure and the corresponding operating hoop stress, taking pressure gradient into account, for the segment of pipeline involved; and

(f) The actual area affected by the population density increase, and physical barriers or other factors which may limit further expansion of the more densely populated area.

192.611 Change in class location; confirmation or revision of maximum allowable operating pressure.

If the hoop stress corresponding to the established maximum allowable operating pressure of a segment of pipeline is not commensurate with the present class location, and the segment is in satisfactory physical condition, the maximum allowable operating pressure of that segment of pipeline must be confirmed or revised as follows:

(a) If the segment involved has been previously tested in place to at least 90 percent of its SMYS for a period of not less than 8 hours, the maximum allowable operating pressure must be confirmed or reduced so that the corresponding hoop stress will not exceed 72 percent of SMYS of the pipe in Class 2 locations, 60 percent of SMYS in Class 3 locations, or 50 percent of SMYS in Class 4 locations.

(b) If the segment involved has not been previously tested in place as described in paragraph (a) of this section, the maximum allowable operating pressure must be reduced so that the corresponding hoop stress is not more than that allowed by this part for new segments of pipelines in the existing class location.

(c) If the segment of pipeline involved has not been qualified for operation under paragraph (a) or (b) of this section, it must be tested in accordance with the applicable requirements of Subpart J of this part, and its maximum allowable operating pressure must then be established so as to be equal to or less than the following:

(1) The maximum allowable operating pressure after the requalification test is 0.8 times the test pressure for Class 2 locations, 0.667 times the test pressure for Class 3 locations, and 0.555 times the test pressure for Class 4 locations.

(2) The maximum allowable operating pressure confirmed or revised in accordance with this section, may not exceed the maximum allowable operating pressure established before the confirmation or revision.

(3) The corresponding hoop stress may not exceed 72 percent of the SMYS of the pipe in Class 2 locations, 60 percent of SMYS in Class 3 locations, or 50 percent of the SMYS in Class 4 locations.

(d) Confirmation or revision of the maximum allowable operating pressure of a segment of pipeline in accordance with this section does not preclude the application of 192.553 and 192.555.

(e) Confirmation or revision of the maximum allowable operating pressure that is required as a result of a study under 192.609 must be completed as follows:

(1) Confirmation or revision due to changes in class location that occur before July 1, 1973, must be completed not later than December 31, 1974.

(2) Confirmation or revision due to changes in class location that occur on or after July 1, 1973, must be completed within 18 months of the change in class location.

192.613 Continuing surveillance.

(a) Each operator shall have a procedure for continuing surveillance of its facilities to determine and take appropriate action concerning changes in class location, failures, leakage history, corrosion, substantial changes in cathodic protection requirements, and other unusual operating and maintenance conditions.

(b) If a segment of pipeline is determined to be in unsatisfactory condition but no immediate hazard exists, the operator shall initiate a program to recondition or phase out the segment involved, or, if the segment cannot be reconditioned or phased out, reduce the maximum allowable operating pressure in accordance with 192.619 (a) and (b).

192.615 Emergency plans.

(a) Each operator shall establish written procedures to minimize the hazard resulting from a gas pipeline emergency. At a minimum, the procedures must provide for the following:

(1) Receiving, identifying, and classifying notices of events which require immediate response by the operator.

(2) Establishing and maintaining adequate means of communication with appropriate fire, police, and other public officials.

(3) Prompt and effective response to a notice of each type of emergency, including the following:

(i) Gas detected inside or near a building.

(ii) Fire located near or directly involving a pipeline facility.

(iii) Explosion occurring near or directly involving a pipeline facility.

(iv) Natural disaster.

(4) The availability of personnel, equipment, tools, and materials, as needed at the scene of an emergency.

(5) Actions directed toward protecting people first and then property.

(6) Emergency shutdown and pressure reduction in any section of the operator's pipeline system necessary to minimize hazards to life or property.

(7) Making safe any actual or potential hazard to life or property.

(8) Notifying appropriate fire, police, and other public officials of gas pipeline emergencies and coordinating with them both planned responses and actual responses during an emergency.

(9) Safely restoring any service outage.

(10) Beginning action under 192.617, if applicable, as soon after the end of the emergency as possible.

(b) Each operator shall —

(1) Furnish its supervisors who are responsible for emergency action a copy of that portion of the latest edition of the emergency procedures established under paragraph (a) of this section as necessary for compliance with those procedures.

(2) Train the appropriate operating personnel to assure that they are knowledgeable of the emergency procedures and verify that the training is effective.

(3) Review employee activities to determine whether the procedures were effectively followed in each emergency.

(c) Each operator shall establish and maintain liaison with appropriate fire, police, and other public officials to —

(1) Learn the responsibility and resources of each government organization that may respond to a gas pipeline emergency;

(2) Acquaint the officials with the operator's ability in responding to a gas pipeline emergency.

(3) Identify the types of gas pipeline emergencies of which the operator notifies the officials; and

(4) Plan how the operator and officials can engage in mutual assistance to minimize hazards to life or property.

(d) Each operator shall establish a continuing educational program to enable customers, the public, appropriate government organizations, and persons engaged in excavation related activities to recognize a gas pipeline emergency for the purpose of reporting it to the operator or the appropriate public officials. The program and the media used must be as comprehensive as necessary to reach all areas in which the operator transports gas. The program must be conducted in English and in other languages commonly understood by a significant number and concentration of the non-English speaking population in the operator's area.

192.617 Investigation of failures.

Each operator shall establish procedures for analyzing accidents and failures, including the selection of samples of the failed facility or equipment for laboratory examination, where appropriate, for the purpose of determining the causes of the failure and minimizing the possibility of a recurrence.

192.619 Maximum allowable operating pressure; steel or plastic pipelines.

(a) Except as provided in paragraph (c) of this section, no person may operate a segment of steel or plastic pipeline at a pressure that exceeds the lowest of the following:

(1) The design pressure of the weakest element in the segment, determined in accordance with Subparts C and D of this part.

(2) The pressure obtained by dividing the pressure to which the segment was tested after construction as follows:

(i) For plastic pipe in all locations, the test pressure is divided by a factor of 1.5.

(ii) For steel pipe operated at 100 p.s.i.g. or more, the test pressure is divided by a factor determined in accordance with the following table:

Factors¹, segment--

Class location	Installed before 11-12-70	Installed after 11-11-70	Converted under §192.14
1.....	1.1	1.1	1.25
2.....	1.25	1.25	1.25
3.....	1.4	1.5	1.5
4.....	1.4	1.5	1.5

¹For offshore segments installed, uprated, or converted after July 31, 1977, that are not located on an offshore platform, the factor is 1.25. For segments installed, uprated, or converted after July 31, 1977, that are located on an offshore platform or on a platform in inland navigable waters (including a pipe riser), the factor is 1.5.

(3) The highest actual operating pressure to which the segment was subjected during the 5 years preceding July 1, 1970 (or in the case of offshore gathering lines, July 1, 1976), unless the segment was tested in accordance with paragraph (a)(2) of this section after July 1, 1965 (or in the case of offshore gathering lines, July 1, 1971), or the segment was uprated in accordance with Subpart K of this part.

(4) For furnace butt welded steel pipe, a pressure equal to 60 percent of the mill test pressure to which the pipe was subjected.

(5) For steel pipe other than furnace butt welded pipe, a pressure equal to 85 percent of the highest test pressure to which the pipe has been subjected, whether by mill test or by the post installation test.

(6) The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressure.

(b) No person may operate a segment to which paragraph (a) (6) of this section is applicable, unless over-pressure protective devices are installed on the segment in a manner that will prevent the maximum allowable operating pressure from being exceeded, in accordance with 192.195.

(c) Notwithstanding the other requirements of this section, an operator may operate a segment of pipeline found to be in satisfactory condition, considering its operating and maintenance history, at the highest actual operating pressure to which the segment was subjected during the 5 years preceding July 1, 1970, or in the case of offshore gathering lines, July 1, 1976, subject to the requirements of §192.611.

192.621 Maximum allowable operating pressure; high-pressure distribution systems.

(a) No person may operate a segment of a high pressure distribution system at a pressure that exceeds the lowest of the following pressures, as applicable:

(1) The design pressure of the weakest element in the segment, determined in accordance with Subparts C and D of this part.

(2) 60 p.s.i.g., for a segment of a distribution system otherwise designed to operate at over 60 p.s.i.g., unless the service lines in the segment are equipped with service regulators or other pressure limiting devices in series that meet the requirements of 192.197 (c).

(3) 25 p.s.i.g. in segments of cast iron pipe in which there are unreinforced bell and spigot joints.

(4) The pressure limits to which a joint could be subjected without the possibility of its parting.

(5) The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressures.

(b) No person may operate a segment of pipeline to which paragraph (a) (5) of this section applies, unless overpressure protective devices are installed on the segment in a manner that will prevent the maximum allowable operating pressure from being exceeded, in accordance with §192.195.

192.623 Maximum and minimum allowable operating pressure; low-pressure distribution systems.

(a) No person may operate a low-pressure distribution system at a pressure high enough to make unsafe the operation of any connected and properly adjusted low-pressure gas burning equipment.

(b) No person may operate a low pressure distribution system at a pressure lower than the minimum pressure at which the safe and continuing operation of any connected and properly adjusted low-pressure gas burning equipment can be assured.

192.625 Odorization of gas.

(a) A combustible gas in a distribution line must contain a natural odorant or be odorized so that at a concentration in air of one-fifth of the lower explosive limit, the gas is readily detectable by a person with a normal sense of smell.

(b) After December 31, 1976, a combustible gas in a transmission line in a Class 3 or Class 4 location must comply with the requirements of paragraph (a) of this section unless—

(1) At least 50 percent of the length of the line downstream from that location is in a Class 1 or Class 2 location;

(2) The line transports gas to any of the following facilities which received gas without an odorant from that line before May 5, 1975;

(i) An underground storage field;

(ii) A gas processing plant;

(iii) A gas dehydration plant; or

(iv) An industrial plant using gas in a process where the presence of an odorant—

(A) Makes the end product unfit for the purpose for which it is intended;

(B) Reduces the activity of a catalyst; or

(C) Reduces the percentage completion of a chemical reaction; or

(3) In the case of a lateral line which transports gas to a distribution center, at least 50 percent of the length of that line is in a Class 1 or Class 2 location.

(c) In the concentrations in which it is used, the odorant in combustible gases must comply with the following:

(1) The odorant may not be deleterious to persons, materials, or pipe.

(b) No person may operate a segment of pipe line to which paragraph (a) of this section applies. (2) The products of combustion from the odorant may not be toxic when breathed nor may they be corrosive or harmful to those materials to which the products of combustion will be exposed.

(d) The odorant may not be soluble in water to an extent greater than 2.5 parts to 100 parts by weight.

(e) Equipment for odorization must introduce the odorant without wide variations in the level of odorant.

(f) Each operator shall conduct periodic sampling of combustible gases to assure the proper concentration of odorant in accordance with this section.

(g) The odorization requirements of Part 190 of this chapter, as in effect on August 12, 1970, must be complied with, in each State in which odorization of gas in transmission lines is required by that part, until the earlier of the following dates:

- (1) January 1, 1977; or
- (2) The date upon which the distribution companies in that State are odorizing gas in accordance with paragraphs (a) through (f) of this section.

192.627 Tapping pipelines under pressure.

Each tap made on a pipeline under pressure must be performed by a crew qualified to make hot taps.

192.629 Purging of pipelines.

(a) When a pipeline is being purged of air by use of gas, the gas must be released into one end of the line in a moderately rapid and continuous flow. If gas cannot be supplied in sufficient quantity to prevent the formation of a hazardous mixture of gas and air, a slug of inert gas must be released into the line before the gas.

(b) When a pipeline is being purged of gas by use of air, the air must be released into one end of the line in a moderately rapid and continuous flow. If air cannot be supplied in sufficient quantity to prevent the formation of a hazardous mixture of gas and air, a slug of inert gas must be released into the line before the air.

(c) In the concentration in which it is used, the odorant in combustible gas must comply with the following:

(1) The odorant may not be deleterious to persons, materials, or pipe.

(4) For furnace butt welded steel pipe a pressure equal to 60 percent of the mill test pressure to which the pipe was subjected.

(5) For steel pipe other than furnace butt welded pipe, a pressure equal to 85 percent of the highest test pressure to which the pipe has been subjected, whether by mill test or by the post installation test.

(6) The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressure.

(7) No person may operate a segment to which paragraph (a) of this section is applicable, unless protective devices are installed on the segment in a manner that will prevent the maximum safe operating pressure from being exceeded, in accordance with 192.195.

(8) Notwithstanding the other requirements of this section, an operator may operate a segment of pipeline found to be in satisfactory condition, considering its operating and maintenance history, at the highest actual operating pressure to which the segment was subjected during the 2 years preceding July 1, 1970, or in the case of gathering lines, July 1, 1977, subject to the requirements of 192.195.

(9) A segment of a distribution system may be operated at a pressure that exceeds the lowest of the following pressures, as applicable:

(i) The design pressure of the weakest element in the segment, determined in accordance with Subpart C and D of this part.

(ii) The design pressure of a distribution system operating at over 60 percent of the design pressure in the segment are provided with safety receptors or other pressure-reducing devices in series that meet the requirements of 192.195.

(iii) The design pressure of cast iron pipe in which there are reinforced bell and spigot joints.

(iv) The pressure limits to which a joint could be subjected without the possibility of its parting.

(5) The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressure.

Subpart M—Maintenance

192.701 Scope

This subpart prescribes minimum requirements for maintenance of pipeline facilities.

192.703 General

(a) No person may operate a segment of pipeline, unless it is maintained in accordance with this subpart.

(b) Each segment of pipeline that becomes unsafe must be replaced, repaired, or removed from service.

(c) Hazardous leaks must be repaired promptly.

192.705 Transmission line: patrolling.

(a) Each operator shall have a patrol program to observe surface conditions on and adjacent to the transmission line right-of-way for indications of leaks, construction activity, and other factors affecting safety and operation.

(b) The frequency of patrols is determined by the size of the line, the operating pressure, the class location, terrain, weather, and other relevant factors, but intervals between patrols may not be longer than prescribed in the following table:

MAXIMUM INTERVAL BETWEEN PATROLS

Class location of line	At highway and railroad crossings	At all other places
1,2	.6 months	1 year
3	.3 months	.6 months
4	do.	.3 months

192.706 Transmission lines; leakage surveys.

(a) Each operator of a transmission line shall provide for periodic leakage surveys of the line in its operating and maintenance plan.

(b) Leakage surveys of a transmission line must be conducted at intervals not exceeding 1 year. However, in the case of a transmission line which transports gas in conformity with Section 192.625 without an odor or odorant, leakage surveys using leak detector equipment must be conducted—

(1) In Class 3 locations, at intervals not exceeding 6 months; and

(2) In Class 4 locations, at intervals not exceeding 3 months.

192.707 Line markers for mains and transmission lines.

(a) Buried pipelines. Except as provided in paragraph (b) of this section, a line marker must be placed and maintained as close as practical over each buried main and transmission line—

(1) At each crossing of a public road, railroad, and navigable waterway; and

(2) Wherever necessary to identify the location of the transmission line or main to reduce the possibility of damage or interference.

However, until January 1, 1978, paragraphs (a)(1) and (a)(2) of this section do not apply to mains installed before April 21, 1975, and until January 1, 1978, paragraph (a)(1) of this section does not apply to transmission lines installed before April 21, 1975.

(b) Exceptions for buried pipelines. Line Markers are not required for buried mains and transmission lines—

(1) Located offshore or under inland navigable waters;

(2) In Class 3 or 4 locations—

(i) Where placement of a marker is impractical; or

(ii) Where a program for preventing interference with underground pipelines is established by law; or

(3) In the case of navigable waterway crossings, within 100 feet of line marker placed and maintained at that waterway in accordance with this section.

(c) Pipelines aboveground. Line markers must be placed and maintained along each section of a main and transmission line that is located aboveground in an area accessible to the public.

(d) Markers other than at navigable waterways. The following must be written legibly on a background of sharply contrasting color on each line marker not placed at a navigable waterway:

(1) The word "Warning," "Caution," or "Danger" followed by the words "Gas (or name of gas transported) Pipeline" all of which, except for markers in heavily developed urban areas, must be in letters at least one inch high with one-quarter inch stroke.

(2) The name of the operator and the telephone number (including area code) where the operator can be reached at all times.

(e) Markers at navigable waterways. Each line marker at a navigable waterway must have the following characteristics:

(1) A sign, rectangular in shape, with narrow strip along each edge colored international orange and the area between lettering on the sign and boundary strips colored white.

(2) Written on the sign in block style, black letters—

(i) The word "Warning," "Caution," or "Danger," followed by the words "Do Not Anchor or Dredge" and the words "Gas (or name of gas transported) Pipeline Crossing"; and

(ii) The name of the operator and the telephone number (including area code) where the operator can be reached at all times.

(3) In overcast daylight, the sign is visible and the writing required by paragraph (e) (2) (i) of this section is legible, from approaching or passing vessels that may damage or interfere with the pipeline.

(f) Existing markers. Line markers installed before April 21, 1975, which do not comply with paragraph (d) or (e) of this section may be used until January 1, 1980.

192.709 Transmission lines; record-keeping.

Each operator shall keep records covering each leak discovered, repair made, transmission line break, leakage survey, line patrol, and inspection, for as long as the segment of transmission line involved remains in service.

192.711 Transmission lines; general requirements for repair procedures.

(a) Each operator shall take immediate temporary measures to protect the public whenever:

(1) A leak, imperfection, or damage that impairs its serviceability is found in a segment of steel transmission line operating at or above 40 percent of the SMYS; and

(2) It is not feasible to make a permanent repair at the time of discovery. As soon as feasible, the operator shall make permanent repairs.

(b) Except as provided in 192.717 (a)(3) no operator may use a welded patch as a means of repair.

192.713 Transmission lines; permanent field repair of imperfections and damage.

(a) Except as provided in paragraph (b) of this section, each imperfection or damage that impairs the serviceability of

a segment of steel transmission line operating at or above 40 percent of SMYS must be repaired as follows:

(1) If it is feasible to take the segment out of service, the imperfection or damage must be removed by cutting out a cylindrical piece of pipe and replacing it with pipe of similar or greater design strength.

(2) If it is not feasible to take the segment out of service, a full encirclement welded split sleeve of appropriate design must be applied over the imperfection or damage.

(3) If the segment is not taken out of service, the operating pressure must be reduced to a safe level during the repair operations.

(b) Submerged offshore pipelines and submerged pipelines in inland navigable waters may be repaired by mechanically applying a full encirclement split sleeve of appropriate design over the imperfection or damage.

192.715 Transmission lines; permanent field repair of welds.

Each weld that is unacceptable under 192.241 (c) must be repaired as follows:

(a) If it is feasible to take the segment of transmission line out of service, the weld must be repaired in accordance with the applicable requirements of 192.245.

(b) A weld may be repaired in accordance with 192.245 while the segment of transmission line is in service if:

(1) The weld is not leaking;

(2) The pressure in the segment is reduced so that it does not produce a stress that is more than 20 percent of the SMYS of the pipe; and

(3) Grinding of the defective area can be limited so that at least 1/8-inch thickness in the pipe weld remains.

(c) A defective weld which cannot be repaired in accordance with paragraph (a) or (b) of this section must be repaired by installing a full encirclement welded split sleeve of appropriate design.

192.717 Transmission lines; permanent field repair of leaks.

(a) Except as provided in paragraph (b) of this section, each permanent field repair of a leak on a transmission line must be made as follows:

(1) If feasible, the segment of transmission line must be taken out of service and repaired by cutting out a cylindrical piece of pipe and replacing it with pipe of similar or greater design strength.

(2) If it is not feasible to take the segment of transmission line out of service, repairs must be made by installing a full encirclement welded split sleeve of appropriate design, unless the transmission line--

(i) Is joined by mechanical couplings; and

(ii) Operates at less than 40 percent of SMYS.

(3) If the leak is due to a corrosion pit, the repair may be made by installing a properly designed bolt-on-leak clamp; or, if the leak is due to a corrosion pit and on pipe of not more than 40,000 psi SMYS, the repair may be made by fillet welding over the pitted area a steel plate patch with rounded corners, of the same or greater thickness than the pipe, and not more than one-half of the diameter of the pipe in size.

(b) Submerged offshore pipelines and submerged pipelines in inland navigable waters may be repaired by mechanically applying a full encirclement split sleeve of appropriate design over the leak.

192.719 Transmission lines; testing of repairs.

(a) Testing of replacement pipe.

(1) If a segment of transmission line is repaired by cutting out the damaged portion of the pipe as a cylinder, the replacement pipe must be tested to the pressure required for a new line installed in the same location.

(2) The test required by subparagraph (1) of this paragraph may be made on the pipe before it is installed, but all field girth butt welds that are not strength tested must be tested after installation by nondestructive tests meeting the requirements of 192.243.

(b) Testing of repairs made by welding. Each repair made by welding in accordance with 192.713, 192.715, and 192.717 must be examined in accordance with 192.241.

192.721 Distribution systems; patrolling.

(a) The frequency of patrolling mains must be determined by the severity of the conditions which could cause failure or leakage, and the consequent hazards to public safety.

(b) Mains in places or on structures where anticipated physical movement or external loading could cause failure or leakage must be patrolled at intervals not exceeding 3 months.

192.723 Distribution systems; leakage surveys and procedures.

(a) Each operator of a distribution system shall provide for periodic leakage surveys in its operating and maintenance plan.

(b) The type and scope of the leakage control program must be determined by the nature of the operations and the local conditions, but it must meet the following minimum requirements:

(1) A gas detector survey must be conducted in business districts, including tests of the atmosphere in gas, electric, telephone, sewer and water system manholes, at cracks in pavement and sidewalks, and at other locations providing an opportunity for finding gas leaks, at intervals not exceeding 1 year.

(2) Leakage surveys of the distribution system outside of the principal business areas must be made as frequently as necessary, but at intervals not exceeding 5 years.

192.725 Test requirements for reinstating service lines.

(a) Except as provided in paragraph (b) of this section, each disconnected service line must be tested in the same manner as a new service line, before being reinstated.

(b) Each service line temporarily disconnected from the main must be tested from the point of disconnection to the service line valve in the same manner as a new service line, before reconnecting. However, if provisions are made to maintain continuous service, such as by installation of a bypass, any part of the original service line used to maintain continuous service need not be tested.

192.727 Abandonment or inactivation of facilities.

(a) Each operator shall provide in its operating and maintenance plan for abandonment or deactivation of pipelines, including provisions for meeting each of the requirements of this section.

(b) Each pipeline abandoned in place must be disconnected from all sources and supplies of gas; purged of gas; in the case of offshore pipelines, filled with water or inert materials; and sealed at the ends. However, the pipeline need not be purged when the volume of gas is so small that there is no potential hazard.

(c) Except for service lines, each inactive pipeline that is not being maintained under this part must be disconnected from all sources and supplies of gas; purged of gas; in the case of offshore pipelines, filled with water or inert materials; and sealed at the ends. However, the pipeline need not be purged when the volume of gas is so small that there is no potential hazard.

(d) Whenever service to a customer is discontinued, one of the following must be complied with:

(1) The valve that is closed to prevent the flow of gas to the customer must be provided with a locking device or other means designed to prevent the opening of the valve by persons other than those authorized by the operator.

(2) A mechanical device or fitting that will prevent the flow of gas must be installed in the service line or in the meter assembly.

(3) The customer's piping must be physically disconnected from the gas supply and the open pipe ends sealed.

(e) If air is used for purging, the operator shall ensure that a combustible mixture is not present after purging.

(f) Each abandoned vault must be filled with a suitable compacted material.

192.729 Compressor stations; procedures for gas compressor units.

Each operator shall establish starting, operating, and shutdown procedures for gas compressor units.

192.731 Compressor stations; inspection and testing of relief devices.

(a) Except for rupture discs, each pressure relieving device in a compressor station must be inspected and tested in accordance with 192.739 and 192.743, and must be operated periodically to determine that it opens at the correct set pressure.

(b) Any defective or inadequate equipment found must be promptly repaired or replaced.

(c) Each remote control shutdown device must be inspected and tested, at intervals not to exceed 1 year, to determine that it functions properly.

192.733 Compressor stations; isolation of equipment for maintenance or alterations.

Each operator shall establish procedures for maintaining compressor stations, including provisions for isolating units or sections of pipe and for purging before returning to service.

192.735 Compressor stations; storage of combustible materials.

(a) Flammable or combustible materials in quantities beyond those required for everyday use, or other than those normally used in compressor buildings, must be stored a safe distance from the compressor building.

(b) Aboveground oil or gasoline storage tanks must be protected in accordance with National Fire Protection Association Standard No. 30.

192.737 Pipe-type and bottle-type holders; plan for inspection and testing.

Each operator having a pipe-type or bottle-type holder shall establish a plan for the systematic, routine inspection and testing of these facilities, including the following:

(a) Provision must be made for detecting external corrosion before the strength of the container has been impaired.

(b) Periodic sampling and testing of gas in storage must be made to determine the dew point of vapors contained in the stored gas, that if condensed, might cause internal corrosion or interfere with safe operation of the storage plant.

(c) The pressure control and pressure limiting equipment must be inspected and tested periodically to determine that it is in a safe operating condition and has adequate capacity.

192.739 Pressure limiting and regulating station inspection testing.

Each pressure limiting station, relief device (except rupture discs), and pressure regulating station and its equipment must be subjected, at intervals not exceeding 1 year, to inspections and tests to determine that it is--

(a) In good mechanical condition;

(b) Adequate from the standpoint of capacity and reliability of operation for the service in which it is employed;

(c) Set to function at the correct pressure; and

(d) Properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.

192.741 Pressure limiting and regulating stations; telemetering or recording gages.

(a) Each distribution system supplied by more than one district pressure regulating station must be equipped with telemetering or recording pressure gages to indicate the gas pressure in the district.

(b) On distribution systems supplied by a single district pressure regulating station, the operator shall determine the necessity of installing telemetering or recording gages in the district, taking into consideration the number of customers supplied, the operating pressures, the capacity of the installation, and other operating conditions.

(c) If there are indications of abnormally high or low-pressure, the regulator and the auxiliary equipment must be inspected and the necessary measures employed to correct any unsatisfactory operating conditions.

192.743 Pressure limiting and regulating stations; testing of relief devices.

(a) If feasible, pressure relief devices (except rupture discs) must be tested in place, at intervals not exceeding 1 year, to determine that they have enough capacity to limit the pressure on the facilities to which they are connected to the desired maximum pressure.

(b) If a test is not feasible, review and calculation of the required capacity of the relieving device at each station must be made, at intervals not exceeding one year, and these required capacities compared with the rated or experimentally determined relieving capacity of the device for the operating conditions under which it works.

(c) If the relieving device is of insufficient capacity, a new or additional device must be installed to provide the additional capacity required.

192.745 Valve maintenance; transmission lines.

Each transmission line valve that might be required during any emergency must be inspected and partially operated, at intervals not exceeding 1 year.

192.747 Valve Maintenance; distribution systems.

Each valve, the use of which may be necessary for the safe operation of a distribution system, must be checked and serviced, at intervals not exceeding 1 year.

192.749 Vault maintenance.

(a) Each vault housing pressure regulating and pressure limiting equipment, and having a volumetric internal content of 200 cubic feet or more, must be inspected, at intervals not exceeding 1 year, to determine that it is in good physical condition and adequately ventilated.

(b) If gas is found in the vault, the equipment in the vault must be inspected for leaks, and any leaks found must be repaired.

(c) The ventilating equipment must also be inspected to determine that it is functioning properly.

(d) Each vault cover must be inspected to assure that it does not present a hazard to public safety.

192.751 Prevention of accidental ignition.

Each operator shall take steps to minimize the danger of accidental ignition of gas in any structure or area where the presence of gas constitutes a hazard of fire or explosion, including the following:

(a) When a hazardous amount of gas is being vented into open air, each potential source of ignition must be removed from the area and a fire extinguisher must be provided.

(b) Gas or electric welding or cutting may not be performed on pipe or on pipe components that contain a combustible mixture of gas and air in the area of work.

(c) Post warning signs, where appropriate.

192.753 Caulked bell and spigot joints.

(a) Each cast iron caulked bell and spigot joint that is subject to pressures of 25 p.s.i.g. or more must be sealed with:

- (1) A mechanical leak clamp: or
- (2) A material or device which—

- (i) Does not reduce flexibility of the joint;
- (ii) Permanently bonds, either chemically or mechanically, or both, with the bell and spigot metal surfaces or adjacent pipe metal surfaces; and
- (iii) Seals and bonds in a manner that meets the strength, environmental, and chemical compatibility requirements of 192.53 (a) and (b) and 192.143.

(b) Each cast iron caulked bell and spigot joint that is subject to pressures of less than 25 p.s.i.g. and is exposed for any reason, must be sealed by a means other than caulking.

192.755 Protecting cast iron pipelines.

When an operator has knowledge that the support for a segment of a buried cast iron pipeline is disturbed:

(a) That segment of the pipeline must be protected, as necessary, against damage during the disturbance by:

- (1) Vibrations from heavy construction equipment, trains, trucks, buses, or blasting;

- (2) Impact forces by vehicles;
 - (3) Earth movement;
 - (4) Apparent future excavations near the pipeline;
- or
- (5) Other foreseeable outside forces which may subject that segment of the pipeline to bending stress.

(b) As soon as feasible, appropriate steps must be taken to provide permanent protection for the disturbed segment from damage that might result from external loads, including compliance with applicable requirements of 192.317(a), 192.319, and 192.361(b) - (d).



RAILROAD COMMISSION OF TEXAS

GAS UTILITIES DIVISION
PIPELINE SAFETY
AUSTIN, TEXAS

FOR REPORTING OF GAS PIPELINE ACCIDENTS

**24-HOUR
EMERGENCY
TELEPHONE
NUMBER**

(512) 447-2171

Appendix A—Incorporated by Reference

I. List of organizations and addresses.

A. American National Standards Institute (ANSI), 1430 Broadway, New York, N.Y. 10018 (formerly the United States of American Standards Institute (USASI). All current standards issued by USASI and ASA have been redesignated as American National Standards and continued in effect.

B. American Petroleum Institute (API), 1801 K Street NW., Washington, D.C. 20006, or 300 Corrigan Tower Building, Dallas, Texas 75201.

C. The American Society of Mechanical Engineers (ASME) United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

D. American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, Pa. 19103.

E. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 1815 North Fort Myer Drive, Room 913, Arlington, VA. 22209.

F. National Fire Protection Association (NFPA), 470 Atlantic Avenue, Boston, Massachusetts 02110.

II. Documents incorporated by reference.

Numbers in parentheses indicate applicable editions. Only the latest listed edition applies except that an earlier listed edition may be followed with respect to pipe or components which are manufactured, designed, or installed in accordance with the earlier edition before the latest edition is adopted, unless otherwise provided in this part.

A. American Petroleum Institute:

- (1) API Standard 5A "API Specification for Casing, Tubing, and Drill Pipe" (1968, 1971, 1973 plus Supp. 1).
- (2) API Standard 6A "API Specification for Wellhead Equipment" (1968, 1974).
- (3) API Standard 6D "API Specification for Pipeline Valves" (1968, 1974).
- (4) API Standard 5L "API Specification for Line Pipe" (1967, 1970, 1971 plus Supp. 1, 1973 plus Supp. 1, 1975).
- (5) API Standard 5LS "API Specification for Spiral-Weld Line Pipe" (1967, 1970, 1971 plus Supp. 1, 1973 plus Supp. 1, 1975 plus Supp. 1, and 1977).

(6) API Standard 5LX "API Specification for High-Test Line Pipe" (1967, 1970, 1971 plus Supp. 1, 1973 plus Supp. 1, 1975 plus Supp. 1, and 1977).

[43 FR 18553, May 1, 1978; 43 FR 27540, June 26, 1978]

(7) API Recommended Practice 5L1 "API Recommended Practice for Railroad Transportation of Line Pipe" (1967, 1972).

(8) API Standard 1104 "Standard for Welding Pipe Lines and Related Facilities" (1968, 1973).

B. The American Society for Testing and Materials:

(1) ASTM Specification A53 "Standard Specification for Welded and Seamless Steel Pipe" (A53-65, A53-68, A53-73).

(2) ASTM Specification A72 "Standard Specification for Welded Wrought-Iron Pipe" (A72-64T, A72-68).

(3) ASTM Specification A106 "Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service" (A106-66, A106-68, A106-72a).

(4) ASTM Specification A134 "Standard Specification for Electric-Fusion (Arc)-Welded Steel Plate Pipe, Sizes 16 in. and over" (A134-64, A134-68, A134-73).

(5) ASTM Specification A135 "Standard Specification for Electric-Resistance-Welded Steel Pipe" (A135-63T, A135-68, A135-73a).

(6) ASTM Specification A139 "Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (Sizes 4 in. and over)" (A139-64, A139-68, A139-73).

(7) ASTM Specification A155 "Standard Specification for Electric-Fusion-Welded Steel Pipe for High-pressure Service" (A155-65, A155-68, A155-72a).

(8) ASTM Specification A211 "Standard Specification for Spiral-Welded Steel or Iron Pipe" (A211-63, A211-68, A211-73).

(9) ASTM Specification A333 "Standard Specification for Seamless and Welded Steel Pipe for Low Temperature Service" (A333-64, A333-67, A333-73).

(10) ASTM Specification A372 "Standard Specification for Carbon and Alloy Steel Forgings for Thin-Walled Pressure Vessel" (A372-67, A372-71).

(11) ASTM Specification A377 "Standard Specifications for Cast Iron and Ductile Iron Pressure Pipe" (A377-66, A377-73).

(12) ASTM Specification A381 "Standard Specification for Metal-Arc-Welded Steel Pipe for High-Pressure Transmission Systems" (A381-66, A381-68, A381-73).

(13) ASTM Specification A539 "Standard Specification for Electric Resistance-Welded Coiled Steel Tubing for Gas and Fuel Oil Lines" (A539-65, A539-73).

(14) ASTM Specification B42 "Standard Specification for Seamless Copper Pipe Standard Sizes" (B42-62, B42-66, B42-72).

(15) ASTM Specification B68 "Standard Specification for Seamless Copper Tube, Bright Annealed" (B68-65, B68-68, B68-73).

(16) ASTM Specification B75 "Standard Specification for Seamless Copper Tube" (B75-65, B75-68, B75-73).

(17) ASTM Specification B88 "Standard Specification for Seamless Copper Water Tube" (B88-66, B88-72).

(18) ASTM Specification B251 "Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube" (B251-66, B251-68, B251-72).

(19) ASTM Specification D638 "Standard Test Method for Tensile Properties of Plastic" (D638-77a).

(20) ASTM Specification D2513 "Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings" (D2513-66T, D2513-68, D2513-70, D2513-71, D2513-73, D2513-74a).

(21) ASTM Specification D2517 "Standard Specification for Reinforced Epoxy Resin Gas Pressure Pipe and Fittings" (D2517-66T, D2517-67, D2517-73).

C. The American National Standards Institute, Inc.:

(1) ANSI A21.1 "Thickness Design of Cast-Iron Pipe" (A21.1-1967 A21.1-1972).

(2) ANSI A21.3 "Specifications for Cast Iron Pit Cast Pipe for Gas" (A21.3-1953).

(3) ANSI A21.7 "Cast-Iron Pipe Centrifugally Cast in Metal Molds for Gas" (A21.7-1962).

(4) ANSI A21.9 "Cast-Iron Pipe Centrifugally Cast in Sand-Lined Molds for Gas" (A21.9-1962).

(5) ANSI A21.11 "Rubber-Gasket Joints for Cast-Iron and Ductile-Iron Pressure Pipe and Fittings" (A21.11-1964, A21.11-1972).

(6) ANSI A21.50 "Thickness Design of Ductile-Iron Pipe" (A21.50-1965, A21.50-1971).

(7) ANSI A21.52 "Ductile-Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds for Gas" (A21.52-1965, A21.52-1971).

(8) ANSI B16.1 "Cast Iron Pipe Flanges and Flanged Fittings" (B16.1-1967).

(9) ANSI B16.5 "Steel Pipe Flanges, Flanged Valves and Fittings" (B16.5-1968, B16.5-1973).

(10) ANSI B16.24 "Bronze Flanges and Flanged Fittings" (B16.24-1962, B16.10-1971).

(11) ANSI B36.10 "Wrought Steel and Wrought Iron Pipe" (B36.10-1959, B36.10-1970).

(12) ANSI C1 "National Electrical Code" (C1-1968, C1-1975).

D. The American Society of Mechanical Engineers:

(1) ASME Boiler and Pressure Vessel Code, Section VIII "Pressure Vessels, Division 1" (1968, 1974).

(2) ASME Boiler and Pressure Vessel Code, Section LX "Welding Qualifications" (1968, 1974).

E. Manufacturer's Standardization Society of the Valve and Fittings Industry:

(1) MSP-25 "Standard Marking System for Valves, Fittings, Flanges, and Union" (1964).

(2) MSS SP-44 "Steel Pipe Line Flanges" (1955, 1972, 1975).

(3) MSS SP-52 "Cast Iron Pipe Line Valves" (1957).

(4) MSS SP-70 "Cast Iron Gate Valves, Flanged and Threaded Ends" (1970).

(5) MSS SP-71 "Cast Iron Swing Check Valves, Flanged and Threaded Ends" (1970).

(6) MSS SP-78 "Cast Iron Plug Valves" (1972).

F. National Fire Protection Association:

(1) NFPA Standard 30 "Flammable and Combustible Liquids Code" (1969, 1973).

(2) NFPA Standard 58 "Standard for the Storage and Handling of Liquefied Petroleum Gases" (1969, 1972).

(3) NFPA Standard 59 "Standard for the Storage and Handling of Liquefied Petroleum Gases at Utility Gas Plants" (1968).

(4) NFPA Standard 59A "Storage and Handling Liquefied Natural Gas" (1971, 1972).

Appendix B—Qualification of Pipe

I. Listed Pipe Specifications. Numbers in parentheses indicate applicable editions. Only the latest listed edition applies except that an earlier listed edition may be followed with respect to pipe or components which are manufactured, designed, or installed in accordance with the earlier edition before the latest edition is adopted, unless otherwise provided in this part.

API 5L--Steel and iron pipe (1967, 1970, 1971 plus Supp. 1, 1973 plus Supp. 1, 1975).

API 5LS, Steel pipe (1967, 1970, 1971 plus Supp. 1, 1973 plus Supp. 1, 1975 plus Supp. 1, and 1977).

API 5LX, Steel pipe (1967, 1970, 1971 plus Supp. 1, 1973 plus Supp. 1, 1975 plus Supp. 1, and 1977).

ASTM A53--Steel pipe (1965, 1968, 1973).

ASTM A72--Wrought Iron Pipe (1964T, 1968).

ASTM A106--Steel pipe (1966, 1968, 1972a).

ASTM A134--Steel pipe (1964, 1968, 1973).

ASTM A135--Steel pipe (1963T, 1968, 1973a).

ASTM A139--Steel pipe (1964, 1968, 1973).

ASTM A155--Steel pipe (1965, 1968, 1972a).

ASTM A211--Steel and iron pipe (1963, 1968, 1973).

ASTM A333--Steel pipe (1964, 1967, 1973).

ASTM A377--Cast iron pipe (1966, 1973).

ASTM A381--Steel pipe (1966, 1968, 1973).

ASTM A539--Steel tubing (1965, 1973).

ASTM B42--Copper pipe (1962, 1966, 1972).

ASTM B68--Copper tubing (1965, 1968, 1973).

ASTM B75--Copper tubing (1965, 1968, 1973).

ASTM B88--Copper tubing (1966, 19--).

ASTM B251--Copper pipe and tubing 19-- , 1968, 1972).

ASTM D2513--Thermoplastic pipe and tubing (1966T, 1968, 1970, 1971, 1973, 1974a).

ASTM D2517--Thermosetting plastic pipe and tubing (1966T, 1967, 1973).

ANSI A21.3--Cast iron pipe (1953).

ANSI A21.7--Cast iron pipe (1962).

ANSI A21.9--Cast iron pipe (1962).

ANSI A21.52--Ductile iron pipe (1965, 1971).

II. Steel Pipe of Unknown or Unlisted Specification.

A. Bending Properties. For pipe 2 inches or less in diameter, a length of pipe must be cold bent through at least 90 degrees around a cylindrical mandrel that has a diameter 12 times the diameter of the pipe, without developing cracks at any portion and without opening the longitudinal weld.

For pipe more than 2 inches in diameter, the pipe must meet the requirements of the flattening tests set forth in ASTM A53, except that the number of tests be at least equal to the minimum required in paragraph II-D of this appendix to determine yield strength.

B. Weldability. A girth weld must be made in the pipe by a welder who is qualified under Subpart E of this part. The weld must be made under the most severe conditions under which welding will be allowed in the field and by means of the same procedure that will be used in the field. On pipe more than 4 inches in diameter, at least one test weld must be made for each 100 lengths of pipe. On pipe 4 inches or less in diameter, at least one test weld must be made for each 400 lengths of pipe. The weld must be tested in accordance with API Standard 1104. If the requirements of API Standard 1104 cannot be met, weldability may be established by making chemical tests for carbon and manganese, and proceeding in accordance with section IX of the ASME Boiler and Pressure Vessel Code. The same number of chemical tests must be made as are required for testing a girth weld.

C. Inspection. The pipe must be clean enough to permit adequate inspection. It must be visually inspected to ensure that it is reasonably round and straight and there are no defects which might impair the strength or tightness of the pipe.

D. Tensile Properties. If the tensile properties of the pipe are not known, the minimum yield strength may be taken as 24,000 p.s.i.g. or less, or the tensile properties may be established by per-

forming tensile tests as set forth in API Standard 5LX. All test specimens shall be selected at random and the following number of tests must be performed:

Number of Tensile Tests—All Sizes

10 lengths or less:

1 set of tests for each length.

11 to 100 lengths:

1 set of tests for each 5 lengths, but not less than 10 tests.

Over 100 lengths:

1 set of tests for each 10 lengths, but not less than 20 tests.

If the yield-tensile ratio, based on the properties determined by those tests, exceeds 0.85, the pipe may be used only as provided in 192.55.

III. Steel Pipe Manufactured Before November 12, 1970, to earlier editions of Listed Specifications.

Steel pipe manufactured before November 12, 1970, in accordance with a specification of which a later edition is listed in Section I of this appendix, is qualified for use under this part if the following requirements are met:

A. Inspection. The pipe must be clean enough to permit adequate inspection. It must be visually inspected to ensure that it is reasonably round and straight and that there are no defects which might impair the strength or tightness of the pipe.

B. Similarity of specification requirements. The editions of listed specification under which the pipe was manufactured must have substantially the same requirements with respect to the following properties as a later edition of that specification listed in Section I of this appendix:

(1) Physical (mechanical) properties of pipe, including yield and tensile strength, elongation, and yield to tensile ratio, and testing requirements to verify those properties.

(2) Chemical properties of pipe and testing requirements to verify those properties.

C. Inspection or test of welded pipe. On pipe with welded seams, one of the following requirements must be met:

(1) The edition of the listed specification to which the pipe was manufactured must have substantially the same requirements with respect to nondestructive inspection of welded seams and the standards for acceptance or rejection and repair as a later edition of the specification listed in Section I of this appendix.

(2) The pipe must be tested in accordance with Subpart J of this part to at least 1.25 times the maximum allowable operating pressure if it is to be installed in a Class 1 location and to at least 1.5 times the maximum allowable operating pressure if it is to be installed in a Class 2, 3 or 4 location. Notwithstanding any shorter time period permitted under Subpart J of this part, the test pressure must be maintained for at least 8 hours.

Appendix C—Qualification of Welders for Low Stress Level Pipe

I. **Basic test.** The test is made on pipe 12 inches or less in diameter. The test weld must be made with the pipe in a horizontal fixed position so that the test weld includes at least one section of overhead position welding. The beveling, root opening, and other details must conform to the specifications of the procedure under which the welder is being qualified. Upon completion, the test weld is cut into four coupons and subjected to a root bend test. If, as a result of this test, two or more of the four coupons develop a crack in the weld material, or between the weld material and base metal, that is more than 1/8-inch long in any direction, the weld is unacceptable. Cracks that occur on the corner of the specimen during testing are not considered.

II. **Additional tests for welders of service line connections to mains.** A service line connection fitting is welded to a pipe section with the same diameter as a typical main. The weld is made in the same position as it is made in the field. The

weld is unacceptable if it shows a serious undercutting or if it has rolled edges. The weld is tested by attempting to break the fitting off the run pipe. The weld is unacceptable if it breaks and shows incomplete fusion, overlap, or poor penetration at the junction of the fitting and run pipe.

III. **Periodic tests for welders of small service lines.** Two samples of the welder's work, each about 8 inches long with the weld located approximately in the center, are cut from steel service line and tested as follows:

- (1) One sample is centered in a guided bend testing machine and bent to the contour of the die for a distance of 2 inches on each side of the weld. If the sample shows any breaks or cracks after removal from the bending machine, it is unacceptable.
- (2) The ends of the second sample are flattened and the entire joint subjected to a tensile strength test. If failure occurs adjacent to or in the weld metal, the weld is unacceptable. If a tensile strength testing machine is not available, this sample must also pass the bending test prescribed in sub-paragraph (1) of this paragraph.

Appendix D—Criteria for Cathodic Protection and Determination of Measurements

I. Criteria for cathodic protection.

A. Steel, cast iron, and ductile iron structures.

(1) A negative (cathodic) voltage of at least 0.85 volt, with reference to a saturated copper-copper sulfate half cell. Determination of this voltage must be made with the protective current applied, and in accordance with sections II and IV of this appendix.

(2) A negative (cathodic) voltage shift of at least 300 millivolts. Determination of this voltage shift must be made with the protective current applied, and in accordance with sections II and IV of this appendix. This criterion of voltage shift applies to structures not in contact with metals of different anodic potentials.

(3) A minimum negative (cathodic) polarization voltage shift of 100 millivolts. This polarization voltage shift must be determined in accordance with sections III and IV of this appendix.

(4) A voltage at least as negative (cathodic) as that originally established at the beginning of the Tafel segment of the E-log-I curve. This voltage must be measured in accordance with section IV of this appendix.

(5) A net protective current from the electrolyte into the structure surface as measured by an earth current technique applied at predetermined current discharge (anodic) points of the structure.

B. Aluminum structures.

(1) Except as provided in subparagraphs (3) and (4) of this paragraph, a minimum negative (cathodic) voltage shift of 150 millivolts, produced by the application of protective current. The voltage shift must be determined in accordance with sections II and IV of this appendix.

(2) Except as provided in subparagraphs (3) and (4) of this paragraph, a minimum negative (cathodic) polarization voltage shift of 100 millivolts. This polarization voltage shift must be determined in accordance with sections III and IV of this appendix.

(3) Notwithstanding the alternative minimum criteria in subparagraphs (1) and (2) of this paragraph, aluminum, if cathodically protected at voltages in excess of 1.20 volts as measured with reference to a copper-copper sulfate half cell, in accordance with section IV of this appendix, and compensated for the voltage (IR) drops other than those across the structure-electrolyte boundary, may suffer corrosion resulting from the buildup of alkali on the metal surface. A voltage in excess of 1.20 volts may not be used unless previous test re-

sults indicate no appreciable corrosion will occur in the particular environment.

(4) Since aluminum may suffer from corrosion under high pH conditions, and since application of cathodic protection tends to increase the pH at the metal surface, careful investigation or testing must be made before applying cathodic protection to stop pitting attack on aluminum structures in environments with a natural pH in excess of 8.

C. Copper structures.

A minimum negative (cathodic) polarization voltage shift of 100 millivolts. This polarization voltage shift must be determined in accordance with sections III and IV of this appendix.

D. Metals of different anodic potentials.

A negative (cathodic) voltage, measured in accordance with section IV of this appendix, equal to that required for the most anodic metal in the system must be maintained. If amphoteric structures are involved that could be damaged by high alkalinity covered by subparagraphs (3) and (4) of paragraph B of this section, they must be electrically isolated with insulating flanges, or the equivalent.

II. Interpretation of voltage measurement.

Voltage (IR) drops other than those across the structure-electrolyte boundary must be considered for valid interpretation of the voltage measurement in paragraph A(1) and (2) and paragraph B(1) of section I of this appendix.

III. Determination of polarization voltage shift.

The polarization voltage shift must be determined by interrupting the protective current and measuring the polarization decay. When the current is initially interrupted, an immediate voltage shift occurs. The voltage reading after the immediate shift must be used as the base reading from which to measure polarization decay in paragraphs A(3), B(2), and C of section I of this appendix.

IV. Reference half cells.

A.

Except as provided in paragraphs B and C of this section, negative (cathodic) voltage must be measured between the structure surface and a saturated copper-copper sulfate half cell contacting the electrolyte.

B.

Other standard reference half cells may be substituted for the saturated copper-copper sulfate half cell. Two commonly used reference half cells are listed below along with their voltage equivalent to -0.85 volt as referred to a saturated copper-copper sulfate half cell:

(1) Saturated KCl calomel half cell: -0.78 volt.

(2) Silver-silver chloride half cell used in sea water:--0.80 volt.

C. In addition to the standard reference half cells, an alternate metallic material or structure may be used in place of the saturated copper-copper sulfate half cell if its potential stability is assured and if its voltage equivalent referred to a saturated copper-copper sulfate half cell is established.

RAILROAD COMMISSION OF TEXAS

GAS UTILITIES DIVISION

IN RE: Safety Regulations for Gas Pipeline
Facilities and the Transportation
of Gas.

Gas Utilities
Docket No. 446

After due notice the Commission on November 10, 1969, heard testimony from representatives of persons owning or operating gas pipeline facilities, with regard to changes or additions to and the expansion, revision, or modification of the safety code for gas transmission lines, heretofore adopted by the Commission's Order dated August 27, 1969, in Gas Utilities Docket No. 422.

WHEREAS, the authority of the Commission to regulate gas pipeline facilities and the transportation of gas was clarified through the adoption by the 61st Legislature of Article 6053-1, Revised Civil Statutes of Texas; and

WHEREAS, since the adoption of Commission's Order in Gas Utilities Docket No. 422, the Office of Pipeline Safety, Department of Transportation, has published 49 CFR Part 192, known as Minimum Safety Standards, with amendments; and

WHEREAS, the Commission has determined that the standards of design, construction, maintenance, and operation of gas pipeline facilities provided in said 49 CFR Part 192, with amendments, are more stringent than the safety code heretofore in effect within the State of Texas.

IT IS, THEREFORE ORDERED BY THE RAILROAD COMMISSION OF TEXAS from and after the effective date of this Order, and pursuant to the Rules and Regulations contained in the attached Appendix, all gas pipeline facilities and the transportation of gas within this State, except those facilities and that transportation of gas which are subject to the exclusive Federal jurisdiction under the Federal Natural Gas Pipeline Act of 1968, shall be constructed, maintained and operated in accordance with the Minimum Safety Standards known as 49 CFR Part 192, with

amendments. Appendix "A" attached includes additional rules and regulations which are hereby adopted.

IT IS FURTHER ORDERED that since the safety code provided by the Order of the Commission in Gas Utilities Docket No. 422 is superseded by the safety code adopted herein, said Order is therefore rescinded.

IT IS FURTHER ORDERED that the Gas Utilities Director be, and he is, hereby specifically authorized and instructed to prepare, execute, authenticate, and transmit to the Secretary of Transportation of the United States all such certificates as are, from time to time, necessary or appropriate under the Federal Natural Gas Pipeline Act of 1968 to preserve to the greatest extent permitted by said Act exclusive State jurisdiction over gas pipeline facilities and the transportation of gas within this State.

IT IS FURTHER ORDERED that this cause be held open for such other and further orders as may be deemed necessary.

ENTERED AT AUSTIN, TEXAS, this 31st day of December, 1970.

RAILROAD COMMISSION OF TEXAS

(signed)
BEN RAMSEY, Chairman
BYRON TUNNELL, Commissioner

ATTEST:
(seal)

(signed)
George F. Singletary, Jr.
Acting Secretary, RRC

RULES AND REGULATIONS
ADOPTED BY THE RAILROAD COMMISSION OF TEXAS

GAS UTILITIES DOCKET NO. 446

APPENDIX A

RULE 1. DEFINITIONS.

As Used in These Rules - -

(1) "Person" means any individual, firm, joint venture, partnership, corporation, association, state, municipality, cooperative association, or joint stock association, and includes any trustee, receiver, assignee, or personal representative thereof;

(2) "Gas" means natural gas, flammable gas, or gas which is toxic or corrosive;

(3) "Transportation of gas" means the gathering, transmission or distribution of gas by pipeline or its storage within the State of Texas; except that it shall not include the gathering of gas in those rural locations which lie outside the limits of any incorporated or unincorporated city, town, village or any other designated residential or commercial area such as a subdivision, a business or shopping center, a community development, or any similar populated area which the Secretary of Transportation may define as a non-rural area.

(4) "Pipeline facilities" includes, without limitation, new and existing pipe, right-of-way and any equipment, facility or building used in the transportation of gas or the treatment of gas during the course of transportation;

(5) "Gas company" means any person who owns or operates pipeline facilities used for the transportation of gas;

(6) "Commission" means the Railroad Commission of Texas.

RULE 2. SAFETY CODE ADOPTED.

Except with reference to pipeline facilities and the transportation of gas which are subject to the jurisdiction of the Federal Power Commission under the Natural Gas Act, 15 U.S.C.A., §§ 17 et seq., all gas pipeline facilities and the transportation of gas shall be subject to the provisions of 49 CFR Part 192, with amendments, promulgated by the Office of Pipeline Safety, Department of Transportation, and known as the Minimum Safety Standards, a copy of which is on file with the Secretary of the Commission.

RULE 3. STANDARDS MINIMUM ONLY.

The Minimum Safety Standards adopted in Rule 2 above establish minimum standards of accepted good practice. Nothing contained herein shall prevent the Commission, after an appropriate public hearing or investigation, from prescribing more stringent standards in individual situations.

RULE 4. SPECIAL CIRCUMSTANCES.

(1) In the event any gas company cannot determine to its satisfaction the standards applicable to special circumstances, it may, by written application, request the Commission for advice and recommendations, and in a special case, the Commission may authorize exemption from, or modification or temporary suspension of any of the provisions of the Minimum Safety Standards.

(2) In the event any gas company which is operating or shall hereafter operate pipeline facilities and transport gas, some of which facilities and transportation are subject to the jurisdiction of this Commission and others of which are subject only to the jurisdiction of the Department of Transportation under the Natural Gas Pipeline Safety Act of 1968, notifies this Commission that it desires that all of its pipeline facilities and transportation of gas be subject to the exclusive jurisdiction of the Department of Transportation, the Director, Gas Utilities Division, may grant exemption from compliance with the safety Rules and Regulations of this Commission upon the statement, under oath, of an officer of such gas company that it will fully comply with the Federal Safety Rules and Regulations respecting its pipeline facilities and transportation of gas otherwise subject to the jurisdiction of this Commission.

RULE 5. RETROACTIVITY.

Nothing in these Rules and Regulations provided shall be applied retroactively to any existing installations insofar as its design, fabrication, installation, or estimated operating pressure is concerned, except as required by Regulations of the Office of Pipeline Safety, Department of Transportation.

RULE 6. NO CIVIL LIABILITY.

It is further provided that the Minimum Safety Standards as adopted herein shall not be so construed as to impose upon any gas company any civil liability for damages, which liability would not exist if said Code had not been adopted herein, nor to relieve any such liability which would have existed had such Code not been adopted herein.

RULE 7. REPORTING OF ACCIDENTS.

(1) In the event of a reportable accident, as defined hereinafter, upon a gas company's pipeline facilities, the company shall notify the Commission by telephone of said accident at the earliest practicable moment following discovery, and shall report, in writing, a summary of said accident within twenty (20) days after detection

on forms supplied by the Department of Transportation. A reportable accident is hereby defined to be any fatality, or any personal injury requiring hospitalization, or any property damage exceeding \$1,000.00 arising out of the transportation of gas.

(2) All written reports required by Part 191, Title 49, of the Code of Federal Regulations shall be submitted to the Commission in duplicate on forms supplied by the Department of Transportation, and one copy of the same shall, within ten (10) days of receipt thereof, and not later than February 15, for Annual Reports, be transmitted by the Director of the Gas Utilities Division to the Director, Office of Pipeline Safety, Department of Transportation, Washington, D. C., 20590.

RULE 8. RECORDS.

On and after the effective date of these Rules, each gas company operating gas facilities subject to the safety jurisdiction of this Commission shall comply with the provisions of the Minimum Safety Standards as amended, with respect to records required. In addition each gas company shall maintain records, as the Commission may require; adequate to show compliance or non-compliance with such Rules. All such records shall at reasonable times be kept open and readily available to the Commission and/or its Staff.

RULE 9. INSPECTION AND MAINTENANCE PLANS.

Each gas company operating a gas facility subject to the safety jurisdiction of this Commission shall file with the Commission a plan for Inspection and Maintenance of its facilities. If the Commission finds the plan is inadequate to achieve safe operation it shall require the plan to be revised. Thereafter, any and all changes in such plan of Inspection and Maintenance shall be filed with the Commission twenty (20) days before it becomes effective.

RULE 10. ENFORCEMENT.

The Staff Engineers of the Railroad Commission of Texas shall have responsibility for the enforcement of the provisions of these Rules. To this end, and subject to the approval of the Commission, they shall formulate a plan or program for periodic auditing of the books and records of gas companies operating in Texas on

a random sampling basis, in order to satisfy the Commission that the provisions of such Rules are being fully complied with. The Staff Engineers shall investigate and report to the Commission in writing as to each instance in which it appears that such provisions have not been complied with, and shall tender their recommendations for bringing about prompt compliance.

As part of the Commission's over-all program of enforcement, the Staff Engineers shall include a plan for assuring compliance with these Rules in connection with upgrading or uprating of any existing installation. They shall, by periodic audit of gas company records, and by other means, and at least annually, verify that each gas company operating in Texas is in compliance with the Minimum Safety Standards and Gas Utilities Docket No. 446. They shall report to the Commission all cases of noncompliance promptly and recommend such action as they deem appropriate in the premises.

In the matter of the enforcement of the provisions of these Rules, each gas company operating in Texas, and its officers and employees shall make readily available to the Commission, or its Staff, any files, records, or other documents which shall be reasonably required in connection with the enforcement of any of the provisions of these Rules, or the investigation of any violations thereof.

Likewise, the plant, property, and facilities of such gas companies shall be made readily accessible to the Commission, and its Staff, in the administration and enforcement of these Rules in the investigation of violation or alleged violations of any of its provisions.

Such gas companies shall likewise provide to the Commission, or its Staff, such reports, supplemental data, and information as it shall from time to time reasonably require, in the administration and enforcement of the provisions of these Rules, or in the investigation of any violations or alleged violations of such Rules.

RULE 11. REVISIONS OF THE MINIMUM SAFETY STANDARDS.

Amendments, changes, and revisions of 49 CFR Part 192, known as the Minimum Safety Standards, shall be effective as a Rule or Regulation of this Commission unless specifically rejected by the Commission.

GAS UTILITIES

SUBSTANTIVE RULE 12

051.04.03.012 ODORIZATION EQUIPMENT, ODORIZATION OF NATURAL GAS AND ODORANT CONCENTRATION TESTS

(a) Definitions

(1) The term "gas" when used in this rule means natural gas, flammable gas, or gas which is toxic or corrosive.

(2) The term "gas company" when used in this rule, shall mean and include every person, firm, corporation, or government entity, including but not limited to municipal corporations, gas utility as defined in TEX. REV. CIV. STAT. ANN. art. 6050, et seq. (1962) and public utility as defined in art. 1446c, § 3(c)(3)(Supp. 1978), engaged in the activity of:

(A) Handling, storing, selling, or distributing for direct use by the ultimate consumer gas for private or commercial uses, or;

(B) Supplying gas by pipelines, or otherwise, for direct consumption in any public building or buildings, or by the general public, or;

(C) Operating a "transmission line" under the circumstances described in Title 49 Code of Federal Regulations, Part 192.625(b) and amendments thereto.

(3) "Farm tap odorizer" as used herein means a wick type odorizer serving a consumer or consumers using not more than 10 Mcf on an average day in any month.

(b) Odorization of Gas

(1) From and after the effective date of this rule, every gas company shall continuously odorize gas, by the use of a malodorant agent in accordance with the requirements set out hereinafter unless the gas shall contain a natural malodor as hereinafter described and provided for.

(2) Except to the extent required by Title 49 Code of Federal Regulations Part 192.625(b) odorization is not required for gas in:

(A) Underground or other storage, or;

(B) Gas used or sold primarily for use in natural gasoline extraction plants, recycling plants, chemical plants, carbon black plants, industrial plants, irrigation pumps, or;

(C) Gas used in lease and field operation or development or in repressuring wells.

(3) If gas is delivered for use primarily in one of the above exempted activities or facilities and is also used in one of those activities for space heating, refrigeration, water heating, cooking and other domestic uses, or if such gas is used for furnishing heat, or air conditioning for office or living quarters, such latter gas shall be odorized in accordance with these rules by the user.

(c) General

(1) A party, or the Commission staff, desiring Commission action under this rule by an informal proceeding pursuant to TEX. REV. CIV. STAT. ANN. art. 6252-13a, § 13e (Supp. 1978) shall make written application and furnish all necessary supporting data including necessary written waivers of hearing and issuance of a Proposal for Decision by an Examiner. The staff shall evaluate the application and make a recommendation to the Commission within a reasonable time

following receipt of such application and all supporting information requested by the staff. If the staff approves the requested action, and the Commission agrees, the order granting the requested action may be signed without notice or hearing. If the staff or the Commission disapproves the application, the matter shall be docketed and processed in accordance with normal hearing procedures as set out in TEX. REV. CIV. STAT. ANN. art. 6252-13a, § 13 (Supp. 1978).

(2) The rules In Re: Odorization of Natural Gas or Liquefied Petroleum Gases, and Specifications for Design, Construction and Operation of Containers for Transporting, Storing or Dispensing Liquefied Petroleum Gases, Tex. R.R. Comm'n, Gas Utilities Docket No. 122 (July 27, 1937) Rules 5, 6, and 7, and In Re: Odorization of Natural Gas, Tex. R.R. Comm'n, Gas Utilities Docket No. 183, (July 28, 1958) and all amendments thereto are hereby repealed as of the effective date of this rule.

(3) All reports and certificates filed under this rule shall be subject to the penalties provided in TEX. REV. CIV. STAT. Natural Resources Code § 91.143 (Supp. 1978). (2-5 years in the penitentiary and \$1,000 fine or both)

(d) Odorization Equipment

All gas companies shall utilize odorization equipment approved by the Railroad Commission of Texas as follows:

(1) Commercial manufacturers of equipment used for introducing malodorant required in this rule may submit plans and specifications of such equipment to the Railroad Commission of Texas for advance approval of standardized models and designs if the equipment is of a type commercially manufactured under accepted rules and practices of the industry.

(2) In the event a gas company plans to install commercially available gas odorization equipment which has been approved for use according to the procedure outlined in subsection (1) herein, prior to such installation the gas company shall submit to the Safety and Engineering Section of the Gas Utilities Division, the brand name, model number, location of the odorizer, and certification that the equipment will be installed and operated, according to the manufacturer's specifications. If an approved odorizer is moved from one location to another location, or if one type of approved odorizer is substituted for another, then the gas company must notify the Safety and Engineering Section of the Gas Utilities Division of the brand name of the odorizer to be moved, the model number, the old location, and the new location. No action shall be necessary on the part of the Safety and Engineering Section of the Gas Utilities Division when the above information, in proper order, is filed concerning approved odorization equipment except the assignment of a new identification number.

(3) All gas companies shall, before the installation of shop made or other odorization equipment not commercially available or approved according to the procedure outlined in Subsections (1) and (2) herein, submit to the Railroad Commission plans and specifications in duplicate describing the equipment to be used for introducing the malodorant required by this rule. The Railroad Commission shall indicate its approval or disapproval of such plans by written Order.

(4) Any odorization equipment previously approved for use and in use on the effective date of this rule need not be reapproved under the terms of this rule.

(e) Malodorants

(1) The Gas Utilities Division shall maintain and promulgate approved lists of malodorants which shall meet the following criteria:

(A) The malodorant when blended with gas in the amount specified for adequate odorization of such gas shall not be deleterious to humans or to the materials present in a gas system; and shall not be soluble in water to a greater extent than 2 1/2 parts, by weight, of malodorant to 100 parts by weight, of water.

(B) The products of combustion from the malodorant shall be non-toxic to humans breathing air containing the products of combustion, and the products of combustion shall not be corrosive or harmful to the materials to which such products of combustion would ordinarily come in contact.

(C) The malodorant agent to be introduced in the gas, or the natural malodor of the gas, or the combination of the malodorant and the natural malodor of the gas, shall have a distinctive malodor so that when gas is present in air at a concentration of as much as 1 percent by volume the malodor is readily detectable by a person with a normal sense of smell.

(2) Injection of approved malodorant at the following rates is adequate to meet the criteria set forth in Sub-paragraph (1)(C) above:

(A) 0.3 pounds per MMCF for concentrated malodorants; and,

(B) 0.5 gallons per MMCF for dilute malodorant.

(3) On its own motion or at the request of any gas company or affected person, the Commission shall determine, after examination of any gas having a natural malodor, the necessary rate of injection of additional malodorant, if any, which shall be necessary to meet the requirements of Subsections (1) (C) and (2)

herein as an exception to the approved injection rates.

(f) Odorization Reports

(1) Within thirty days after annual periods ending December 31, every gas company shall report to the Commission the following information for all odorizers except farm tap odorizers which require reporting pursuant to Section (g)(2) herein:

(A) The type of malodorant or malodorants introduced into the gas during each month or quarter of the annual period;

(B) The quantity of gas odorized by each malodorant or malodorants during each month or quarter of the annual period;

(C) The amount of malodorant injected per million cubic feet;

(2) In the event a gas company shall fail to timely file its odorization report or file an odorization report which on its face shows non-compliance, the gas company may be put on remedial status after written notice to it of such status and be required to report odorization monthly within twenty days after the close of each month or for such other interval and for such period of time as shall be necessary to remedy the deficiencies in its odorization report or reports.

(3) Gas companies which obtain gas into which malodorant has already been injected shall be exempt from the filing of odorization reports with respect to such gas.

(4) The first annual odorization report shall cover the period of time beginning January 1, 1979, and ending December 31, 1979. Until that time, quarterly odorization reports shall be filed 30 days after each calendar quarter stating the same information as required in Subsection (1) of this section.

(g) Malodorant Test

(1) Odorant concentration tests including room tests, and the use of malodorant concentration test meters, both according to the requirements and procedures heretofore promulgated by the Gas Utilities Division as Exhibit A hereto or other tests approved by the Commission and conducted in accordance with procedures approved and promulgated by the Commission, shall be conducted by every gas company of the gas supplied through its facilities and required to be odorized. Test points shall be distant from odorizing equipment, so as to be representative of the odorized gas in the system. Tests shall be performed at least once each calendar year, or at such other times as the Commission or staff may require. The results of these tests shall be reported to the Commission no later than January 31 of the following calendar year or at such other times as the Commission may require. (2) Farm tap odorizers shall be exempt from the odorization testing requirements of Subsection (1) herein. Farm tap odorizers shall be checked, tested, and serviced at least annually according to the terms of a service and maintenance plan filed with and approved by the Commission. Gas companies having farm tap odorizers shall certify to the Commission on January 31 of each year that service and maintenance of each such odorizer was performed during the preceding twelve months ending December 31 and that each odorizer was found to be in good working condition, or, if not, what remedial steps were taken to put each odorizer in good working condition.

(3) Gas companies which obtain gas into which malodorant has already been injected or gas which is considered to have a natural malodor and therefore do not odorize the gas themselves shall be required to conduct quarterly malodorant concentration tests and submit the results 30 days after semi-annual periods ending June 30 and December 31.

EXHIBIT A

PROCEDURE FOR CONDUCTING ROOM TEST TO DETERMINE MALODORANT CONCENTRATIONS

Testing of gas to determine its level of detectability by distinctive malodor may be accomplished by use of the room test method. The test must indicate that at the point of malodor detection the gas present in air was in concentrations of one percent by volume or less as described in Tex. R.R. Comm'n Gas Util. Div. Substantive Rules 051.04.03.012 (e)(1)(C). The report of test results shall be reported on the form prescribed and promulgated by the Safety and Engineering Section and shall contain the following:

1. Odorizer name and location, the Railroad Commission individual odorizer identification number, if applicable, as listed on the odorization report.
2. Description of gas meter or method of measurement used.
3. Date test performed, hours, odorizer(s) tested, and distance from odorizer.
4. Malodorant name, type, injection rate (in pounds or gallons per Mmcf).
5. Test results showing gas meter reading point at which each of at least three (3) witnesses and one (1) test supervisor detected the presence of gas by malodor, converting the average of these (4) to percent of room volume.
6. Signatures of minimum required witnesses and supervisors described above.

PROCEDURE FOR THE USE OF MALODORANT CONCENTRATION TEST METERS

Testing of gas to determine its level of detectability by distinctive malodor may be accomplished by commercially available malodorant concentration meters according to their operating instructions, and the results of such tests may be used in substitution for room tests prescribed in Texas Railroad Commission Gas Utilities Division Special Substantive Rule 051.04.03.012 (g)(1) at the option of the gas company. The report of test results shall be reported on the form prescribed and promulgated by the Safety and Engineering Section and shall contain the following:

1. Odorizer name and location, the Railroad Commission individual odorizer identification number, if applicable, as listed on odorization report.
2. Malodorant concentration meter make, model and range.
3. Date test performed, hour, odorizer(s) tested, and distance from odorizer.
4. Malodorant name, type, injection rate (in pounds or gallons per Mmcf).
5. Test results: showing meter reading when malodor first detected, percent gas in air and milliampere meter reading if applicable.
6. Signature of person performing the test.

RAILROAD COMMISSION OF TEXAS

GAS UTILITIES DIVISION

IN RE: Development of Written Procedures
for Handling Leak Complaints

Gas Utilities
Docket No. 484

ORDER

After due notice the Commission on August 22, 1972, heard testimony from representatives of persons owning or operating gas pipeline facilities, with regard to the adoption of a requirement for development of written procedures for handling leak complaints.

WHEREAS, the authority of the Commission to regulate gas pipeline facilities and the transportation of gas was clarified through the adoption by the 61st Legislature of Article 6053-1, RCS of Texas; and

WHEREAS, the Commission issued Gas Utilities Docket No. 446; and

WHEREAS, Gas Utilities Docket No. 446, Rule 3 gives the Commission authority to prescribe more stringent standards; and

WHEREAS, the Commission has determined that public safety requires the adoption of written procedures for handling leak complaints.

IT IS, THEREFORE, ORDERED BY THE RAILROAD COMMISSION OF TEXAS that from and after the effective date of this order, each distribution company shall have written procedures which shall include as a minimum the following:

1. Provision for receiving leak complaints and/or reports on a 24 hour, 7 day per week basis.
2. Provision requiring written record of all calls received and actions taken.
3. Provision requiring supervisory personnel to review calls received and actions taken to insure no hazardous conditions exist at the close of the work day.

4. Provision for training and equipping personnel used in the investigation of leak complaints and/or reports.
5. Provision for locating source of leak and determining degree of hazard involved.
6. Chain of command for service personnel to follow if assistance is required in determining degree of hazard.
7. Instructions to be issued by service personnel to customer and/or the public as necessary after leak is located and degree of hazard determined.

IT IS FURTHER ORDERED that the written procedures required by this Order be filed with the Commission within 30 days after the effective date of this Order.

IT IS FURTHER ORDERED that this cause be held open for such other and further orders as may be deemed necessary.

ENTERED AT AUSTIN, TEXAS, this 30th day of January, 1973.

RAILROAD COMMISSION OF TEXAS

(signed)
JIM C. LANGDON, Chairman
BYRON TUNNELL, Commissioner
BEN RAMSEY, Commissioner

ATTEST:
(seal)

(signed)
George F. Singletary, Jr.
Secretary, RRC.

COPY OF GAS UTILITIES ACT

Articles 6050 to 6066, Inclusive, R.C.S., 1925 (As Amended)

ARTICLE 6050. Classification - The term "gas utility" and "public utility" or "utility", as used in this subdivision, means and includes persons, companies and private corporations, their lessees, trustees, and receivers, owning, managing, operating, leasing or controlling within this State, any wells, pipe lines, plant property, equipment, facility, franchise, license, or permit for either one or more of the following kinds of business:

1. Producing or obtaining, transporting, conveying, distributing or delivering natural gas: (a) for public use or service for compensation; (b) for sale to municipalities or persons or companies, in those cases referred to in paragraph 3 hereof, engaged in distributing or selling natural gas to the public; (c) for sale or delivery of natural gas to any person or firm or corporation operating under franchise or a contract with any municipality or other legal subdivision of this State; or, (d) for sale or delivery of natural gas to the public for domestic or other use.

2. Owning or operating or managing a pipe line for the transportation or carriage of natural gas, whether for public hire or not, if any part of the right of way for said line has been acquired, or may hereafter be acquired, by the exercise of the right of eminent domain.

3. Producing or purchasing natural gas and transporting or causing the same to be transported by pipe lines to or near the limits of any municipality in which said gas is received and distributed or sold to the public by another public utility or by said municipality, in all

cases where such business is in fact the only or practically exclusive agency of supply of natural gas to such utility or municipality, is hereby declared to be virtual monopoly and a business and calling affected with a public interest, and the said business and property employed therein within this State shall be subject to the provisions of this law and to the jurisdiction and regulation of the Commission as a gas utility.

Every such gas utility is hereby declared to be affected with a public interest and subject to the jurisdiction, control, and regulation of the Commission as provided herein. (Acts 3rd C.S., 1920, P. 18.)

Section 4. Provided, however, that the act or acts of transporting, delivering, selling or otherwise making available natural gas for fuel, either directly or indirectly, to the owners of irrigation wells or the sale, transportation or delivery of natural gas for any other direct use in agricultural activities shall not be construed within the terms of this law as constituting any person, association, corporation, trustee, receiver, or partnership as a "gas utility", "public utility", or "utility" as hereinabove--defined so as to make such person, association, corporation, trustee, receiver or partnership, subject to the jurisdiction, control and regulation of the Commission as a gas utility. (Acts 1954, 53rd Leg.; 1st C.S., p. 70, ch. 31, 1.)

Section 4a. The natural gas made available under the provisions of this Act shall be used exclusively for pumping water for farm and other agricultural purposes in order for the person, firm, association, or corporation furnishing such natural gas to be exempt from the provisions of said Article 6050 of the

Revised Civil Statutes of Texas of 1925. The provisions of this Act shall be considered only as cumulative of other laws and shall not have the effect of repealing or amending any substantive or statutory law except as herein specifically provided. (Acts 1954, 53rd Leg., 1st C.S., p. 70, ch. 31, 1.)

ARTICLE 6051. May Enjoin Gas Pipe Line. - The operation of gas pipe lines for buying, selling, transporting, producing, or otherwise dealing in natural gas is a business which in its nature and according to the established method of conducting the business is a monopoly and shall not be conducted unless such gas pipe line so used in connection with such business be subject to the jurisdiction herein conferred upon the Commission. The Attorney General shall enforce this provision by injunction or other remedy. (Acts 1920, 3rd C.S., p. 18.)

ARTICLE 6052. Utility Office. - Every gas utility as defined herein shall have an office in one of the counties of this State in which its property or some part thereof is located and shall keep in said office all books, accounts, papers, records, vouchers, and receipts which the Commission shall require. No books, accounts, papers, records, receipts, vouchers or other data required by the Commission to be so kept shall be at any time removed from this State except upon such condition as the Commission may prescribe. Id.

ARTICLE 6053. Regulation of Utilities. - Rates; rules and regulations

SECTION 1. The Commission after due notice shall fix and establish and enforce the adequate and reasonable price of gas and fair and reasonable rates of charges and regulations for transporting, producing, distributing, buying, selling, and delivering gas by such pipe lines in this State; and shall establish fair equitable rules and regulations for the full control and supervision of said gas pipe lines and

all their holdings pertaining to the gas business in all their relations to the public, as the Commission may from time to time deem proper, and establish a fair and equitable division of the proceeds of the sale of gas between the companies transporting or producing the gas and the companies distributing or selling it; and prescribe and enforce rules and regulations for the government and control of such pipe lines in respect to their gas pipe lines, and producing, receiving, transporting, and distributing facilities; and regulate and apportion the supply of gas between towns, cities, and corporations, and when the supply of gas controlled by any gas pipe line shall be inadequate, the Commission shall prescribe fair and reasonable rules and regulations requiring such gas pipe lines to augment their supply of gas, when in the judgment of the Commission it is practicable to do so; and it shall exercise its power whether upon its own motion or upon petition by any person, corporation, municipal corporation, county or Commissioners' precinct showing a substantial interest in the subject, or upon petition of the Attorney General, or of any County or District attorney in any county wherein such business or any part thereof may be carried on. As amended Acts 1939, 46th Leg., p. 501, 1.

SECTION 1a. Notwithstanding any law to the contrary the commission shall promulgate rules, regulations, and standards under which any owner, operator, or manager of a mobile home park may purchase natural gas through a master meter for delivery from such master meter to mobile home units within the mobile home park through individual submeters at each mobile home unit. Such rules and regulations shall require (a) that the owner, operator, or manager of a mobile home park shall not deliver natural gas for sale or resale for profit and (b) that the mobile home park shall maintain adequate records in connection with such submetering and shall make the records available for inspection by the

mobile home resident during reasonable business hours.

Malodorants, investigation
and regulation

SECTION 2. In addition to the duties and power of the Commission hereinabove set forth, it is empowered and it shall be its duty to investigate the use of malodorants by persons, firms, or corporations engaged in the business of handling, storing, selling or distributing natural and liquefied petroleum gases, including butane and other odorless gases, for private or commercial uses, or supplying the same by pipe lines or otherwise, to any public building or buildings, or to the general public, and the Commission is empowered to require such persons, firms, or corporations to odorize such gas by the use of a malodorant agent of such character as to indicate by a distinctive odor, the presence of gas; such malodorant agent so required to be used, however, shall be nontoxic and non-corrosive and not harmful to leather diaphragms in gas equipment, the method of its use and containers and equipment to be used in connection therewith to be under the direction of and as approved by the Railroad Commission of Texas; the Commission having full power and authority to prescribe such rules and regulations as in its wisdom may be deemed necessary to carry out the purposes of this Act. Nothing herein contained shall apply to gas transported out of the State of Texas. (As amended Acts 1939, 46th Leg., p. 501, 1.)

ARTICLE 6053--1. Transportation of Gas
and Gas Pipeline Facilities; Safety
Standards

(A) For the purpose of providing state control over safety standards and practices applicable to the transportation of gas and all gas pipeline facilities within the borders of this state to the maximum degree permissible under the federal Natural Gas Pipeline Safety Act of 1968, the

Railroad Commission of Texas is hereby expressly granted the power to describe or adopt by regulation safety standards for all such transportation of gas and gas pipeline facilities which are not subject to exclusive federal control, to require record maintenance and reports and to inspect records and facilities to determine compliance with such safety standards, and, from time to time, to make certifications and reports and to take any other requisite action in accordance with Section 5(a) of the Natural Gas Pipeline Safety Act of 1968.

(B) All terms employed in this Article which are defined in the Natural Gas Pipeline Safety Act of 1968 shall have the definition prescribed therein.

(C) The Attorney General is authorized on behalf of the Railroad Commission, to enforce said safety standards by injunction restraining violations thereof (including the restraint of transportation of gas or the operation of a pipeline facility). Any violation of such safety standards shall further be subject to a civil penalty, payable to the State of Texas, in an amount not to exceed \$1,000 for each violation for each day that such violation persists, except that the maximum civil penalty shall not exceed \$200,000 for any related series of violations. Any such civil penalty may be compromised by the Attorney General in consideration of the appropriateness of the penalty to the size of the business of the person charged, the gravity of the violation, and the good faith of the person charged in attempting to achieve compliance after notification of violation.

(D) Nothing in this Article shall be construed to reduce, limit or impair any power heretofore vested by law in any incorporated city, town or village. Added by Acts 1969, 61st Leg., p. 199, ch. 80, 1, emerg. eff. April 17, 1969.

ARTICLE 6054. Orders, Etc., Reviewed - All orders and agreements of any company or corporation, or any person or persons

controlling such pipe lines establishing and prescribing prices, rates, rules and regulations and conditions of service, shall be subject to review, revision and regulation by the Commission on hearing after notice as provided for herein to the persons, firm, corporation, partnership or joint stock association owning or controlling or operating the gas pipe line affected. Acts 1920, 36th Leg., 3rd C.S., p. 18, ch. 14, 3.

ARTICLE 6055. To Refund Excess Charges. - If any rate or charge for gas or for service or for meter rental or any other purpose pertaining to the operation of said business shall be promulgated by any person, firm, or corporation owning or operating any gas pipe line or in the event of an inadequate supply of gas or inadequate service in any respect, and complaint against same shall be filed by any person authorized by the preceding article to file such petition and such complaint is sustained in whole or in part, all persons and customers of said gas pipe line shall have the right to reparation or reimbursement of all excess in charges so paid over and above the proper rate of charge as finally determined by the Commission from and after the date of the filing of such complaint. Id.

ARTICLE 6056. Operator's Reports. -The Commission may require of all persons and corporations operating, owning, or controlling such gas pipe lines sworn reports of the total quantities of gas distributed by such pipe lines and of that held by them in storage, and also of their source of supply, the number of wells from which they draw their supply, the amount of pressure maintained, and the amount and character and description of the equipment employed, and such other matters pertaining to the business as the Commission may deem pertinent. Id.

ARTICLE 6057. Discrimination. - No such pipe line public utility shall discriminate in favor of or against any person, place or corporation, either in apportioning the supply of natural gas or

in its charges therefor; nor shall any such utility directly or indirectly charge, demand, collect or receive from anyone a greater or less compensation for any service rendered than from another for a like and contemporaneous service; provided, this shall not limit the right of the Commission to prescribe different rates and regulations for the use of natural gas for manufacturing and similar purposes, or to prescribe rates and regulations for service from or to other or different places, as it may determine. Id.

ARTICLE 6057a. Discrimination. - No pipe line public utility, as such utility is defined in the laws of this State governing the production and delivery of natural gas, shall discriminate in favor of or against any person, place or corporation, either in apportioning the supply of natural gas or in its charges therefor; nor shall any such utility directly or indirectly charge, demand, collect or receive from any one a greater or less compensation for any service rendered than from another for a like and contemporaneous service provided this shall not limit the right of the Railroad Commission to prescribe different rates and regulations for the use of natural gas for manufacturing and similar purposes or to prescribe rates and regulations for service from or to other or different places, as it may determine. Id.

ARTICLE 6057b. Penalty for Violation of Law. - Any owner, officer, director, agent or employee of any person, firm or corporation owning, operating or controlling gas pipe lines of such utility mentioned in the preceding article, who shall wilfully violate any provision of the statutes of this State governing such utility, including the preceding article, shall be fined not less than Fifty nor more than One Thousand Dollars, and in addition thereto be imprisoned in jail not less than ten days nor more than six months. Id.

ARTICLE 6058. Appeal from City Control. -When a city government has ordered any existing rate reduced, the gas utility affected by such order may appeal to the Commission by filing with it on such terms and conditions as the Commission may direct, a petition and bond to review the decision, regulation, ordinance, or order of the city, town, or municipality. Upon such appeal being taken the Commission shall set a hearing and may make such order or decision in regard to the matter involved therein as it may deem just and reasonable. The Commission shall hear such appeal de novo. Whenever any local distributing company or concern, whose rates have been fixed by any municipal government, desires a change of any of its rates, rentals, or charges, it shall make its application to the municipal government where such utility is located and such municipal government shall determine said application within sixty days after presentation unless the determination thereof may be longer deferred by agreement. If the municipal government should reject such application or fail or refuse to act on it within said sixty days, then the utility may appeal to the Commission as herein provided. But said Commission shall determine the matters involved in any such appeal within sixty days after the filing by such utility of such appeal with said Commission or such further times as such utility shall in writing agree to, but the rates fixed by such municipal government shall remain in full force and effect until ordered changed by the Commission. Id.

ARTICLE 6059. Appeal from Orders. - If any gas utility or other party at interest be dissatisfied with the decision of any rate, classification, rule, charge, order, act, or regulation adopted by the Commission, such dissatisfied utility or party may file a petition setting forth the particular cause of objection thereto in a court of competent jurisdiction in Travis County against the Commission as defendant. Said action shall have precedence over all other causes on the docket of a different nature and shall be tried and

determined as other civil causes in said court. Either party to said action may have the right of appeal; and said appeal shall be at once returnable to the appellate court, and said action so appealed shall have precedence in said appellate court of all causes of a different character therein pending. If the court be in session at the time such right of action accrues, the suit may be filed during such term and stand ready for trial after ten days notice. In all trials under this article the burden of proof shall rest upon the plaintiff, who must show by clear and satisfactory evidence that the rates, regulations, orders, classifications, acts or charges complained of are unreasonable and unjust to it or them. Id.

ARTICLE 6060. Utility Tax. - Every gas utility subject to the provisions of this subdivision on or before the first day of January and quarterly thereafter, shall file with the Commission a statement, duly verified as true and correct by the president, treasurer, or general manager of a company or corporation, or by the owner of one of them if an individual or co-partnership, showing the gross receipts of such utility for the quarter next preceding or for such portion of said quarterly period as such utility may have been conducting any business, and at such time shall pay into the State Treasury at Austin a sum equal to one-fourth of one percent of the gross income received from all business done by it within this State during said quarter. Id.

ARTICLE 6061. Report to Governor. - The Commission shall on December 1st of each year make a full detailed report to the Governor, who shall transmit the same to the next succeeding session of the Legislature, showing:

1. The proceedings of said Commission to such time with respect to the gas utilities defined herein.

2. The receipts of gross income taxes from all sources, indicating the sources.

3. The expenditures made under and in accordance with this subdivision, the nature of such expenditures, the names, titles, nature of employment, salaries of and payments made to all persons employed for any purpose under the terms of this subdivision with statement of traveling and other expenses incurred by each of said persons and approved by the Commission. Id.

ARTICLE 6062. Penalties. - Any public utility as herein defined violating any provision of this subdivision or failing to perform any duty herein imposed or to comply with any valid order of the Commission when not stayed or suspended by order of the court, shall be subject to a penalty payable to the State of not less than one hundred nor more than one thousand dollars for each offense, each violation to constitute a separate offense, and each day that such failure continues shall constitute a separate offense. An additional penalty of a like amount together with reasonable attorney's fees may also be recoverable by and for the use of any person, corporation or association of persons against whom there shall have been unlawful discrimination as herein defined; such suit to be brought in the name of and for the use of the party aggrieved. Id.

ARTICLE 6063. Receiver. - Whenever any person, firm or corporation owning, operating or controlling such gas pipe line shall violate any provision hereof or any rule or regulation of the Commission, the Commission shall, whenever in its judgment the public interests require it, apply to any court of this State having jurisdiction for a receivership of such concern guilty of such violation. Such receiver shall control and manage the property of such gas pipe line under the direction of the court as provided by law in receivership matters. The grounds for appointment of receiver provided in this Article shall be in addition to other grounds provided by law. Id.

ARTICLE 6064. Duties of Pipe Line Expert. - The supervisor shall likewise assist the Commission in the performance of its duties under this subdivision under the direction of the Commission, under such rules and regulations as it may require. Id.

ARTICLE 6065. Employees of Commission. -The Commission may employ and appoint, from time to time, such experts, assistants, accountants, engineers, clerks and other persons as it deems necessary to enable it at all times to inspect and audit all records or receipts, disbursements, vouchers, prices, payrolls, time cards, books and official records, to inspect all property and records of the utilities subject to the provisions hereof, and to perform such other services as may be directed by the Commission or under its authority. Such persons and employees of the Commission shall be paid for the service rendered, such sums as the Commission may fix. Acts 1920, 36th Leg., 3rd C.S., p. 18, ch. 14, 3; Acts 1959, 56th Leg., p. 634, ch. 288, 1.

ARTICLE 6066. Expenditures. - The salary and expenses of the expert and his assistant and the salaries, wages, fees, and expenses of every other person employed or appointed by the Commission under the provisions of this subdivision, and all other expenses, costs, and charges, including witness fees and mileage incurred by/or under authority of the Commission or a Commissioner in administering and enforcing the provisions of this subdivision or in exercising any power or authority hereunder shall be paid out of the Gas Utilities Division Fund provided for by Article 6060, as amended by House Bill No. 547, Acts at the Regular Session of the 42nd Legislature, by the State Treasurer on warrants of the Comptroller on orders of vouchers approved by the Commission or Chairman thereof. The entire amount derived from the tax imposed by Article 6060, as amended, shall be used for the purpose of

enforcing the provisions of the preceding Article 6050, et seq., and for the purpose of paying for the administration of the conservation laws of this state relating to the production of gas, which includes condensates and distillates, such amounts as are required for this purpose shall be periodically transferred to the special Oil and Gas Enforcement Fund, but not in excess of the amount actually used in the administration of gas conservation regulation. Any surplus remaining in the Gas Utilities Fund (or any surplus remaining in the Oil and Gas Fund in part as a result of such transfer from the Gas Utilities Fund) shall be paid to the General Revenue Fund on September 1 of each year. Acts 1931, 42nd Leg., p. 319, ch. 190, 1; Acts 1959, 56th Leg., p. 633, ch. 287, 1; Acts 1961, 57th Leg., p. 567, ch. 265, 1.

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